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(Continued on third page of the cover.)

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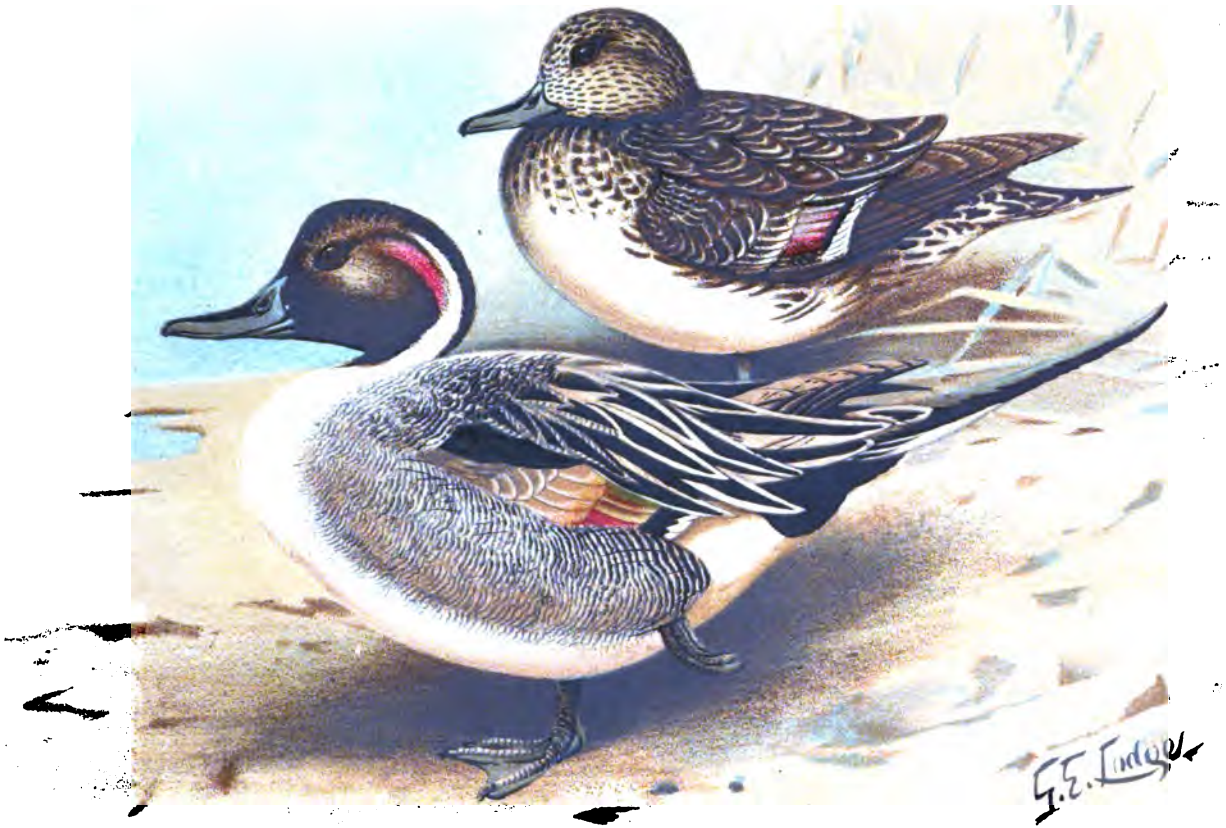

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THE PINTAIL.

Dafila acuta.

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NOTICE.

The accompanying plate (No. XII.) of THE PINTAIL DUCK (*Dafila acuta*) is in continuation of the series of plates already published in this Journal in connection with the paper on "INDIAN DUCKS AND THEIR ALLIES," by Mr. E. C. Stuart Baker.

The description of "THE PINTAIL" now figured will be found on page 437 of VOL. XII. of this Journal.

EDITORS.

pectinated above.

1550c. PEXINOLA LONGIROSTRIS, Hmpsn., Cat. Lep. Phal. B. M., II., p. 79 (1900).

♀. Head, thorax and abdomen grey-white strongly mixed with black. Forewing grey suffused with olive-brown and strongly irrorated with black; an antemedial ridge of blackish scales tipped with white from subcostal

nervure to vein 1 ; tufts of similar scales below the cell at origin of vein 2 and at upper angle, the latter with indistinct blackish line from it bent outwards above inner margin ; a diffused waved dark subterminal line. Hindwing grey-white.

Habitat.—Tibet, Yatung, 10500′. *Exp.* 32 mill.

1534. NOLA NIGRITA belongs to the *Noctuidæ*. Genus MIMORUZA.

1536. RHYNCHOPALPUS DENTATUS belongs to the *Noctuidæ*. Genus LABANDA.

1543*a*. PISARA ARGENTISPARSA belongs to the *Noctuidæ*. Genus ZAGIRA.

1550*a*. SELEA NIGRA belongs to the *Lymntriuadæ*. Genus LYMANTRIA.

AGARISTIDÆ.

1554. CHELONOMORPHA VULCANIA, insert. (syn) *Eusemia glossatrix*, Westw., Oates' Matebeland, p. 356.

1581. MIMEUSEMIA BASALIS.—A ♀ from Sikhim has the orange patch of hindwing absent except for a streak on end of median nervure on underside.

1581*a*. MIMEUSEMIA DAVIDSONI, Swinh., A. M. N. H. (7), 3, p. 112.

♂. Differs from *basalis* in the hindwing, having a yellowish-white patch in and below cell conjoined at lower angle to the discoidal patch ; the orange on inner area reduced to slight streaks.

Habitat.—Karwar. *Exp.* 52 mill.

NOCTUIDÆ.

1657*a*. AGROTIS DERAIOTA, n. sp. (pl. B., f. 7).

♀. Head and thorax dark chocolate-brown ; tegulæ ochreous-white with two brown lines, the tips chocolate ; abdomen brown. Forewing brown suffused with grey ; a short bisinuate subbasal grey line ; an antemedial grey line with two sinuations between costa and vein 1, then strongly excurved and obsolescent ; orbicular grey, V-shaped on a brown patch in cell not suffused with grey and diffused below cell ; reniform with grey outline and centre ; an indistinct dentate postmedial line with two series of dark points on the veins ; an indistinct sinuous submarginal line. Hindwing brown.

Habitat.—Maturatta, Ceylon (Mackwood). *Exp.* 48 mill. *Type*—in B. M.

1679*a*. HADENA AXYLIDES, n. sp.

♀. Head and thorax dark-brown mixed with grey scales ; abdomen ochreous. Forewing grey ; a ferruginous patch on basal area from cell to inner margin ; a very highly dentate antemedial line, rather indistinct and interrupted in places, running out to two very long points in cell, the angle below the cell conjoined to the blackish claviform stigma ; the orbicular indistinct lanceolate ; the reniform indistinct, defined by rufous and with blackish suffusion between it and the double waved postmedial line which is excurved from costa to vein 4, then retracted to below end of cell ; a series of dark points just beyond it ; an irregularly sinuous rufous subterminal line with blackish suffusion beyond it except towards apex. Hindwing white with a slight yellowish tinge towards termen.

Habitat.—Sikhim 1800′ (Dudgeon) ; Belgaum (Watson). *Exp.* 30 mill. *Type*—In B. M.

1682*a*. HADENA CHRYSONA, Borkh., Naturg. Eur. Schmett, IV., p. 264 (1792).

Head, thorax and abdomen clothed with grey and fuscous hair; patagia edged with orange; tarsi banded with black. Forewing grey and fuscous; waved subbasal and antemedial lines with the area between them rather paler, the former with orange points on it below costa and cell, the latter with some orange on it below the cell, then with two stronger sinuations; the orbicular and reniform with some orange on their edges, the former small; the postmedial line crenulate, excurved from costa to vein 3, then incurved, the area beyond it paler; a subterminal series of small V-shaped black marks with orange points between their arms; a terminal series of small lunules; cilia chequered white and fuscous. Hindwing whitish, the veins and terminal area broadly fuscous; some white on termen towards tornus; cilia with a dark line through them, yellowish at base, white at tips, underside with discoidal point and curved postmedial line.

Habitat.—Europe; Syria; W. China; Kashmir. *Exp.* 36 mill.

Under *Euplexia* insert (syns) *Borbotana*, Wlk., IV., 1651 (1858) and *Choluata* Wlk., Journ. Linn. Soc., VII., 57 (1863).

1717*a*. EUPLEXIA OXYDATA, n. sp.

♂. Ferruginous-red; head somewhat variegated with reddish-ochreous; meso- and meta-thorax reddish-ochreous; tarsi banded with ochreous. Forewing variegated with ochreous, especially in base of cell, on inner margin and before the postmedial line; the veins streaked with fuscous; the lines ochreous defined by fine ferruginous lines; a short curved subbasal line; the antemedial line angled inwards in cell and on vein 1, outwards below the cell and below vein 1; orbicular small; the reniform with a white mitre-shaped mark on it; the postmedial line minutely dentate, oblique from costa to vein 4, where it is angled, then incurved; a subterminal series of small wedge-shaped marks, the area beyond them tinged with fuscous except towards apex; cilia ferruginous and fuscous. Hindwing dark-brown; the cilia pale-ferruginous; underside with the veins irrorated with ochreous and fuscous; a prominent dark cell spot.

Habitat.—Sikhim, 7000′ (Pilcher). *Exp.* 50 mill. *Type*—In B. M.

1717*b*. EUPLEXIA PURPURINA, n. sp.

♀. Head, thorax and forewing deep purplish-red; abdomen greyish-brown, the extremity and ventral surface reddish. Forewing with a silky texture; the veins slightly streaked with fuscous; the orbicular almost obsolete; the reniform white strongly irrorated with black; a postmedial series of white points on the veins. Hindwing fuscous-brown, the cilia pale-chestnut; underside with dark discoidal lunule and sinuous postmedial line.

Habitat.—Tibet, Yatung (Hobson). *Exp.* 42 mill. *Type*—In B. M.

1717*c*. EUPLEXIA ASKOLDIS, Oberth. Et. Ent. v. p. 72 pl. 3. f. 13 (1880).

Apamea niralis Butl. Trans. Ent. Soc. 1881, p. 177.

♂. Head and tegulæ red-brown and black mixed with white; thorax and abdomen pure white; legs fuscous with whitish bands on tarsi; abdomen

with the extremity and ventral surface irrorated with brown, the anal tuft with some fulvous hair. Forewing red-brown; the inner area white, its irregular upper edge bounded with black, the white extending before middle nearly up to costa and before the postmedial line to vein 2; a large irregular patch beyond the cell extending to termen at apex and vein 2, and leaving a small fuscous patch on middle of termen; the orbicular with white centre and ochreous ring; the reniform white; the postmedial line white with fuscous edges, dentate, strongly excurved from costa to vein 4, then bent inwards to lower angle of cell; an indistinct curved, slightly waved subterminal line; three white points on costa towards apex; cilia reddish. Hindwing yellowish-white slightly tinged with fuscous towards apex; an indistinct discoidal spot and traces of a curved postmedial line.

Habitat.—Siberia, Askold; Japan; W. China; Assam, Khásis. *Exp.* 30-46 mill.

1725. *Euplexia subcurva.* Larva black with irregular dorsal and lateral grey patches streaked with black; head red, some orange on 1st somite; stigmata white; a large irregular dorsal orange patch on terminal somite (Fellowes Wilson).

1734*a*. EUPLEXIA MESOMELANA, n. sp.

♂. Head, thorax and abdomen fuscous-black; tegulæ in front olive-green; the hair on frons and the tuft behind tegulæ white tipped; the anal tuft greyish. Forewing pinkish-grey; the costal area olive-green with a series of black striæ and some white points towards apex; a white mark in base of cell and curved black streak below the base with an olive and blackish patch beyond it on vein 1; the orbicular with olive-green centre, whitish ring and black line round it; a Y-shaped black medial band with its arms on each side of the orbicular, and becoming olive-green on inner margin; the reniform with black centre, some olive-green on its inner side and white on its outer, and with a black line round it; the postmedial line minutely dentate, indistinct, excurved from costa to vein 4, then incurved; a subterminal whitish line angled at veins 7 and 3, with some black suffusion on its inner side and olive-green on its outer. Hindwing pale-fuscous with discoidal lunule and sinuous postmedial line more distinct on underside; cilia of both wings whitish with a fuscous line through them.

Habitat.—Simla, 7000′ (Pilcher). *Exp.* 36 mill. *Type*—In B. M.

1734*b*. EUPLEXIA CHLOROGRAMMATA, n. sp.

♂. Head and thorax moss-green, mixed with dark-brown scales; palpi ochreous in front; pectus and legs ochreous, the latter irrorated with black and with patches of green above; abdomen fuscous mixed with ochreous. Forewing black-brown and pinkish-brown suffused in parts with green; a green spot at base of costa; a short green subbasal line; an irregularly waved antemedial green line with black line on its outer edge; a series of small green spots on terminal half of costa; the orbicular and reniform large, brown-centred, ringed with green and edged with black; the latter with pale patch

at upper extremity; a green postmedial line edged by waved black lines and excurved beyond the cell; a sinuous green subterminal line connected with the postmedial line by a streak on inner margin and with a pale spot on its inner side above vein 5; a terminal series of black lunules; cilia brown and green. Hindwing pale-yellowish with obscure fuscous discoidal spot and sinuous postmedial line; the terminal area broadly suffused with fuscous; cilia ochreous with a blackish line through them.

Habitat.—Sikhim 1800′ (Dudgeon). *Exp.* 42 mill. *Type*—In B. M.

Sec. III*c*. (*Borbotana*). Forewing of male with elongate foveal depression between bases of veins 6·7 which are thickened and curved.

1756*a*. EUPLEXIA NIVIFASCIA, Wlk., XV., 1651.

Choluata eburneifera, Wlk., Journ. Linn. Soc., VII., 57.

Head and thorax dark red-brown; abdomen paler with the dorsal tufts rufous. Forewing dark red-brown; a pure white antemedial band with irregular edges, the outer edge being slightly toothed outwards below costa and strongly below cell; a white point in cell and irregular discoidal lunule with white spot above it on costa and two points beyond it; a white line from vein 4 to inner margin, dentate inwards above vein 1 in the Bornean specimens, developed into a quadrate patch on inner area in the Sikhim specimen; an indistinct oblique red streak from apex and patch at middle. Hindwing dull reddish-brown, whitish towards base. Underside of both wings irrorated with white; hindwing with discoidal lunule.

Habitat.—Sikhim, Borneo. *Exp.* 28-30 mill.

1758*b*. EUPLEXIA SUBPURPUREA, Leech. Trans. Ent. Soc. 1899, p. 71.

Head and thorax purple and grey, meta-thorax chestnut-red, palpi below, coxæ and parts of pectus fiery-red; tibiæ purplish-fuscous, tarsi whitish; abdomen whitish, brown, and purplish, the dorsal tufts chestnut-red, the anal tuft pale-chestnut, the ventral surface crimson. Forewing ochreous, irrorated and suffused in parts with brown; a purplish patch in and below base of cell; the orbicular somewhat V-shaped, with purplish edges and brownish centre; the reniform with parallel edges, a chestnut patch on it and a purplish line on its inner edge; a purplish line with dark edges from lower angle of cell to above middle of inner margin, then recurved to submedian fold and with bright chestnut suffusion in its angle; a double fuscous postmedial line from just below costa, angled at vein 5, then incurved to the line from angle of cell and with its outer line sinuous; a pale slightly sinuous subterminal line from vein 7 to inner margin, defined on each side by olive-brown; the termen irrorated with blue-grey. Hindwing pale-ochreous, the costal and terminal areas tinged with pink, the inner area with brown; an indistinct fine sinuous postmedial line; two indistinct fine subterminal lines coalescing and becoming diffused from vein 2 to inner margin; some grey suffusion on termen. Underside suffused with fiery-red; forewing with curved, hindwing with sinuous postmedial line; both wings with rather obscure subterminal line and dark blotches on termen.

Habitat.—W. China; Simla, 7,000′. (Pilcher). *Exp.* 54 mill.

1770*a*. ANCARA VIRIDIPICTA, n. sp. (pl. B., f. 6).

♂. Dark red-brown; palpi with the third joint whitish; vertex of head and thorax pale moss-green; abdomen with the two medial dorsal tufts green. Forewing with some white point on costa; two ill-defined subbasal waved blue-green bands, two antemedial and two postmedial, the last with a series of points beyond them excurved at median nervules; some spots in end of cell; traces of a dentate subterminal line developed into irregular patches below middle. Hindwing with four small white subterminal spots towards tornus.

Habitat.—Khâsis. *Exp.* 48 mill. *Type*—In B. M.

1789*a*. POLIA OBLIQUISIGNA, n. sp.

♀. Grey; head, thorax and abdomen mixed with black scales; tegulæ with a black transverse line the area behind it and the patagia whiter. Forewing with black-edged whitish patch on base of costa; some black striæ and white points in cell and on vein 1 before the slightly sinuous black antemedial line; the orbicular large and white with fine black edge and with an irregular white patch below it defined on lower side by the -shaped claviform mark; reniform large, grey-white with fine black edges; the postmedial line represented by a series of white and black points on the veins; an indistinct pale subterminal line defined in parts by black, angled inwards above vein 1 and with some streaks from it to the terminal series of lunules. Hindwing fuscous with indistinct discoidal lunule and darker terminal line; cilia whitish chequered with black at middle; underside whitish irrorated with fuscous, the discoidal spot prominent; an indistinct curved postmedial line.

Habitat.—Simla 7000′. (Pilcher). *Exp.* 40 mill. *Type*—In B. M.

1795*a*. POLIA PYROXANTHA, n. sp.

♂. Head and thorax yellow mixed with bright-ferruginous; abdomen yellowish-grey irrorated with fuscous, the anal tuft pale-rufous. Forewing yellow very largely suffused with bright ferruginous; the veins and costal area brownish; a dark waved antemedial line; the orbicular yellow; a dark-edged white discoidal lunule; a crenulate postmedial line excurved from below costa to vein 3, then incurved. Hindwing ochreous-yellow with traces of discoidal spot and curved postmedial line more distinct on underside.

Habitat.—Tibet, Yatung (Hobson). *Exp.* 30 mill. *Type*—In B. M.

1798*a*. POLIA FUMEA, n. sp.

♂. Head and thorax black; antennæ pale; abdomen fuscous. Forewing fuscous-black irrorated with a few white scales; the orbicular and reniform small, ringed with white and with greyish centres; slight subterminal black streaks on veins 4·5, and a terminal series of black striæ. Hindwing fuscous, the inner area tinged with yellowish-brown; a discoidal dark point and a fine terminal line; cilia whitish at tips.

Habitat.—Sikhim, 1800′; (Dudgeon). *Exp.* 30 mill. *Type*—In B. M.

1806*a*. CUCULLIA POLIORHIZA, n. sp. (pl. B., f. 27).

Head and thorax fuscous mixed with grey ; abdomen brownish-grey. Forewing grey strongly irrorated with black-brown ; an oblique black striga from base of costa ; a short sinuous streak below base of cell ; the antemedial line irregularly dentate, strongly angled outwards below the cell and conjoined to the small diamond-shaped claviform stigma ; the orbicular greyish, narrow, oblique, its lower end conjoined to the lunulate reniform, the two stigmata defined below by a sinuous black streak ; the postmedial line excurved, indistinct, dentate, and angled inwards on vein 1 ; a subterminal series of short black streaks, those on veins 4·5 displaced inwards and the two above inner margin longer and with a blackish mark between them ; cilia of both wings whitish with fine dark line through them. Hindwing grey with darker streaks on the vein.

Allied to *C. petrorhiza*, Bork., from Europe, but darker and without the dark lines on tegulæ and patagia.

Habitat.—Tibet, Yatung (Hobson). *Exp.* 50 mill. *Type*—In B. M.

1813. ACRONYCTA ANÆDINA, insert (Syn.) *Acronycta iria*, Swinh., A. M. N. H. (7):3, p. 113.

1838*a*. CALLOPISTRIA NOCTURNA, n. sp.

♀. Head and thorax clothed with black, fuscous, and red-brown scales, many of them tipped with grey ; abdomen black-brown. Forewing fuscous tinged with blue-grey, many of the scales having pale tips ; some reddish-brown suffusion in parts, especially on medial inner area ; the basal area with traces of waved black lines ; a grey antemedial line defined by black scales, waved from inner margin to subcostal nervure, then curved downwards to median nervure in end of cell, and up again to costa ; the reniform with grey outline ; a postmedial fine black line defined by grey, strongly excurved from below costa to vein 3, then incurved, with a double rufous streak defined by black from it to subterminal line on vein 6 and whitish mark above and below vein 4 ; a fine irregularly waved grey subterminal line ; a terminal series of black lunules defined by grey. Hindwing fuscous-brown ; cilia fuscous with grey tips.

Habitat.—Cuddapah, Horsleykhonda, 3500′ (W. H. Campbell). *Exp.* 30 mill. *Type*—In B. M.

1839*b*. CALLOPISTRIA HARMONICA, n. sp.

♂. Head, thorax and abdomen variegated with pale-brown, madder, black, and white scales ; palpi white towards extremity ; sides of frons and tegulæ with white stripes ; small fulvous tufts behind patagia ; abdomen with rufous dorsal tuft. Forewing olive-brown suffused with purplish and grey scales to beyond middle, and some purplish suffusion on inner area ; two subbasal purple-brown spots with a striga beyond them ; three antemedial spots with a spot on costa beyond them and a striga below the cell ; the orbicular and reniform indistinct, grey with brown outline, with quadrate purple-brown spot between them and spot on costa above it ; a grey band with purple-brown edge beyond cell from below costa, curved to below end of cell, then

erect and with a curved grey band beyond it, followed by a large quadrate purple-brown patch on costa with decreasing spots below it on inner side of the sinuous grey subterminal line which has some brown beyond it towards costa; a series of purple-brown terminal points forming an elongate spot below apex, the cilia beyond it dark. Hindwing fuscous-brown with dark discoidal spot; cilia pale with a dark line through them; underside clothed with grey and red scales; the discal spot prominent; an indistinct dentate postmedial line.

Habitat.—Sikhim (Dudgeon), 1800′. *Exp.* 30 mill. *Type*—In B. M.

1849*a*. CALLOPISTRIA CŒLISIGNA, n. sp.

♀. Head, thorax and abdomen dark-brown mixed with grey-brown. Forewing grey-brown suffused with red-brown and irrorated with black; a strongly curved antemedial dark line defined by pinkish-white on each side; a curved comet-shaped whitish mark from lower angle of cell extending along costa to near apex with a rather darker centre on the discocellulars; an ill-defined blackish line from just above lower angle of cell, angled at vein 4, then incurved; an indistinct grey subterminal band, excurved at middle and with slight pinkish lines on each side of it; an oblique whitish streak from apex and another to middle of termen; cilia intersected with white towards apex. Hindwing fuscous-black, the underside paler with indistinct medial and curved postmedial lines.

Habitat.—Ceylon, Labugania (Macwood). *Exp.* 32 mill. *Type*—In B. M.

1874*a*. CARADRINA DISCOPHORA, n. sp.

♂. Frons with large rounded prominence with flattened plate below it and disc with raised rim and point in centre at its extremity; antennæ laminate.

Head and thorax ochreous slightly mixed with fuscous; palpi and legs with black scales; abdomen ochreous. Forewing ochreous strongly irrorated with black and with numerous indistinct waved lines; the basal area tinged with pink; a pink streak in submedian fold and a less prominent streak in discal fold; the orbicular, reniform and eliptical claviform tinged with pink and with black edges; the subterminal line irregular; a terminal series of black striæ. Hindwing pure white.

Habitat.—Cuddapah, 500′ (W. H. Campbell). *Exp.* 26 mill. *Type*—In B. M.

1874*b*. CARADRINA TENEBROSA, n. sp.

♀. Frons with large rounded prominence with disc with raised rim at its extremity.

Head and thorax grey mixed with brown and black; abdomen brownish-ochreous irrorated with fuscous. Forewing grey strongly irrorated with brown and fuscous; subbasal, antemedial, medial and postmedial oblique black lines from costa, the first two short, the third reaching lower angle of cell, the fourth the upper angle; an ill-defined triangular black-brown patch on costa towards apex with three whitish points on it; an obscure

blackish mark on middle of inner margin and another before termen above middle; a terminal series of black points, the cilia somewhat crenulate. Hindwing whitish suffused with pale brownish-ochreous, the terminal area with fuscous; cilia whitish at tips.

Habitat.—Cuddapah, Horsleykhonda, 3500′ (W. H. Campbell). *Exp.* 30 mill. *Type*—In B. M.

1990*a*. ERASTRIA DORATA, n. sp.

♀. Head and thorax golden-yellow mixed with reddish-brown; abdomen pale-ochreous mixed with fuscous. Forewing pale largely suffused with ferruginous and dark-brown and irrorated with a few black scales; some white scales below basal half of costa; an antemedial white line; an irregular medial white edged golden mark, toothed on outer side in cell; a similar S-shaped reniform stigma; the inner area golden from just before the antemedial to the postmedial line, which is strongly excurved from costa to vein 4, then angled inwards, defined on inner side below vein 4 by a golden band and on outer side by a slender white line; the termen and cilia golden with fine black terminal line. Hindwing yellowish-white strongly irrorated with fuscous; a discoidal spot and minutely waved postmedial line more distinct on underside; a fine terminal black line.

Habitat.—Ceylon (Mackwood). *Exp.* 30 mill. *Type*—In B. M.

1993*a*. ERASTRIA NIVEIGUTTATA, Dudgeon. Ined.

♀. Head pure white; antennæ black except basal joint; palpi with the second and third joints ringed with black; frons with triangular medial black spot and lateral points; thorax black; patagia with some white scales; metathorax with white patch; abdomen grey with dorsal black tufts. Forewing black with irregular subbasal ante- and postmedial white patches on costa, th first small, and ante- and postmedial patches on inner margin; some white points on costa near end of cell and near termen. Hindwing whitish with two obscure fuscous medial lines and the terminal area fuscous.

Habitat.—Sikhim, 1800′. *Exp.* 40 mill.

1996*a*. MALIATTHA PLUMBITINCTA, n. sp.

Head whitish and olive-yellow; abdomen whitish irrorated with fuscous and with the dorsal tufts fuscous. Forewing with the base olive-green turning to yellow; the medial area darker-green irrorated with black and becoming brownish towards costa, defined on inner side by a sinuous white line from cell to inner margin, defined on outer side by a dentate leaden-grey line edged with black, slightly excurved at median nervules and becoming white below vein 2; a leaden-grey discoidal spot and the median nervules streaked with grey to the postmedial line; some diffused black beyond the postmedial line, its outer edge sinuous, excised between veins 4 and 6, and with patches of leaden scales beyond it at costa, vein 5, and above inner margin; the terminal area bright-green; the cilia grey irrorated with white. Hindwing white, the inner area slightly irrorated with fuscous; a terminal series of dark striæ; the cilia tipped with fuscous towards apex,

Habitat.—Tibet, Yatung, 10,500′ (Hobson). *Exp.* 16 mill. *Type*—In B. M.

2092. METACHROSTIS SEPARATA, insert (syn.) *Cosmia ozela*, Swinh., A. M. N. H. (7), 3, p. 114, and transfer to *Catephia* next *flavescens*. *Habitat*—Bhutan; Karwar. *Exp.* ♀ 34-40 mill.

2110*a*. PACHYLEPIS ROSEATA, n. sp.

♂. Head black; the vertex and antennæ whitish; thorax pinkish; abdomen fuscous except towards base; tibiæ and tarsi banded with black. Forewing whitish tinged with pink and irrorated with a few black scales; three elongate black spots on costa and a truncate triangular patch towards apex; an oblique bar-shaped black discoidal spot; a terminal series of black points and a somewhat triangular mark at tornus. Hindwing pale-fuscous with bar-shaped discoidal black spot and whitish postmedial line somewhat angled at middle, then defined by black on inner side, and with blackish patch and white point beyond it towards tornus; a terminal series of black points.

Habitat—Simla, 7000′ (Pilcher). *Exp.* 20 mill. *Type*—In B. M.

2114*a*. EUBLEMMA BILINEATA, n. sp.

♂. Head and tegulæ orange; thorax grey, whitish in front; legs and abdomen brownish-orange. Forewing grey irrorated with white; the costal area whitish; the costal edge orange towards base; a black point with a minute yellowish striga from it at middle of costa; two fine grey postmedial lines arising from black points on costa, strongly excurved below costa, then oblique; the costal area orange towards apex, where there is a white patch with a black spot on it and some orange below it; cilia with fine white lines at their base and near tip. Hindwing pale yellowish grey-brown; traces of an oblique postmedial line; cilia with a yellowish line at base.

Habitat—Simla (Harford); Kulu (Pilcher). *Exp.* 20 mill. *Type*—In B. M.

2130*d*. EUBLEMMA VINOTINCTA, n. sp.

♀. Head and tegulæ pale red-brown; thorax whitish slightly tinged with vinous-red and with dorsal red-brown stripes; abdomen pale-brownish. Forewing whitish suffused with vinous-red, especially towards tornus, the costal edge pale red-brown, slightly waved red-brown antemedial and medial lines angled below costa, then oblique; the postmedial line oblique from costa to vein 6, then sinuous, incurved below vein 3; traces of a pale irregular subterminal line with blackish points on it towards costa. Hindwing vinous-red, whitish towards base and costa; indistinct antemedial, medial and subterminal whitish lines, the last with some black scales on it; both wings with fine white terminal line. Underside tinged with fuscous-brown.

Larva.—Coccidiphagous, feeding on a species of *Lecanium* and forming a covering of their scales.

Habitat—Ceylon, Pundaloya (Green). *Exp.* 16 mill. *Type*—In B. M.

2130*e*. EUBLEMMA SUBANGULATA, n. sp. (pl. B., f. 5).

Greyish-ochreous irrorated with a few dark scales. Forewing with indistinct antemedial line angled inwards in cell and outwards below it; dark points at middle and end of cell; crenulate medial and post-medial lines, excurved beyond cell, then oblique; three blackish subapical marks; the outer margin somewhat angled at middle. Hindwing with slightly waved antemedial and medial lines; a diffused postmedial line and traces of a submarginal series of points; both wings with a fine ochreous line at base of cilia.

Larva—Coccidiphagous; preys on *Maskellia zonata*, Green.

Habitat—Pundaloya, Ceylon (E. E. Green). *Exp.* 20 mill. *Type*—In B. M.

2130*f*. EUBLEMMA RUBRICILIA, n. sp.

♂. Grey irrorated with purplish-fuscous scales; palpi, frons and basal joint of antennæ black. Forewing with very indistinct dentate antemedial, medial, and postmedial lines, the two latter bent outwards to inner margin and arising from small black costal spots; a diffused discoidal spot; a subterminal series of dentate marks; a terminal line. Hindwing with faint traces of dentate antemedial, postmedial and subterminal lines, the terminal area strongly irrorated with fuscous; cilia of both wings bright-rufous with pale line at base. Termen of forewing strongly angled at middle.

Habitat—Sikhim, Bhutan (Dudgeon); Singapore (Ridley). *Exp.* 16 mill.

2130*g*. EUBLEMMA RUBRA, n. sp.

Bright red-brown; abdomen with fine white segmental lines. Forewing with antemedial white line acutely angled below costa, then incurved; a post-medial line oblique and white from costa to vein 5, then grey and sinuous, a yellowish mark from its angle to the oblique white striga from costa terminating in two white-edged black dentate marks with some grey beyond them and followed by some black subterminal points. Hindwing with obscure-oblique antemedial grey line, sinuous postmedial line and subterminal black points.

Habitat—Sikhim, 1800′ (Dudgeon); Singapore; Java. *Exp.* 16 mill. *Type*—In B. M.

2131*b*. EUBLEMMA SEMIRUFA, n. sp.

Grey; head and tegulæ pale-rufous; abdomen with 3rd to terminal segments rufous above, the 3rd, 4th and 5th with whitish segmental lines. Forewing with traces of short subbasal and waved fuscous antemedial lines; an oblique medial rufous striga from costa; a waved post-medial line, angled below costa, and a dentate whitish subterminal line angled outwards at middle, the area between them filled in with rufous except the costal area and traversed by an obscure waved line. Hindwing with nearly straight antemedial and somewhat irregular subterminal line, the area between them rufous irrorated with ochreous traversed by an irregular medial line; cilia of both wings rufous.

The N. Guinea specimen has the rufous area on forewing extending more towards costa and the subterminal line of both wings whiter and more irregularly dentate.

Habitat—Sikhim, 1800′ (Dudgeon); N. Guinea (Wallace). *Exp.* 18. mill. *Type*—In B. M.

2146*a*. CORGATHA OLIVATA, n. sp.

♂. Head and collar olive-brown; thorax and abdomen grey-brown. Forewing olive-green, the basal area grey-brown; an antemedial dark line angled below costa; reniform greyish with dark outline and two black specks at centre; a dark postmedial line excurved beyond cell and with grey-brown suffusion beyond it; a series of brown-edged grey submarginal spots and of black points just inside margin. Hindwing olive-green with the base grey-brown; a medial brown line with grey-brown suffusion beyond it; a very indistinct postmedial series of grey spots and a submarginal series of black points.

Habitat—Sikhim, 1800′ (Dudgeon). *Exp.* 24 mill. *Type*—In B. M.

2155*a*. ORUZA XANTHOPERA, n. sp.

♀. Deep purplish-red-brown; collar and anal tuft ochreous. Forewing with slight pale streak below basal half of costa; some yellow at base of inner margin; a pale oblique antemedial line with dark outer edge; a pale point at upper angle of cell and black point at lower; an oblique slightly sinuous postmedial pale line defined by fuscous on inner side; an obscure irregular subterminal line; a large ochreous patch on outer margin below apex; a small spot above tornus; a terminal series of black points. Hindwings with obliquely sinuous medial line with large irregular patch beyond it below costa and small patch at tornus; a terminal series of black points. Underside of forewing mostly pink; hindwing ochreous suffused with pink in places.

Habitat—Khásis. *Exp.* 30 mill. *Type*—In B. M.

2168*a*. DINUMMA INANGULATA, n. sp.

♀. Brown irrorated with black; patagia with their outer edges black; abdomen with the dorsal tufts black. Forewing with black patch at base of costa; a deep black band just before middle with irregular edges, its inner edge angled inward on vein 1, its outer slightly angled outwards in cell; the postmedial line erect, minutely dentate and with some grey on its outer edge; an indistinct, minutely dentate subterminal line slightly angled outwards below costa; a subterminal series of white and black points developing into a patch with a black spot above it just above middle. Hindwing fuscous-brown. Underside grey irrorated with black; hindwing with dentate fuscous and white subterminal line; both wings with terminal series of black and white points.

Habitat—Sikhim, 2800′ (Pilcher). *Exp.* 34 mill. *Type*—In B. M.

2174*a*. CALLYNA CHALCOELA, n. sp.

Head dark-brown, yellowish on vertex; thorax pale-yellow; abdomen brownish, the dorsal tuft at base pale-yellow, the 2nd segment tinged with orange. Forewing with the inner area brassy-yellow shading to greyish and to olive-brown on costal area; some bluish white at base and some oblique

marks on costal area; an orange subbasal mark on costa; traces of a waved antemedial line; reniform very large and quite round with yellow medial spot and edge; traces of an oblique waved postmedial line with black spots on its outer edge at middle of inner margin and above veins 2 and 4; some irregular white marks just inside and on termen below middle. Hindwing fuscous with obscure ante and postmedial and terminal lines; a yellow patch on inner area at tornus. Underside of forewing mostly suffused with grey and fuscous.

Habitat—China; Sikhim (Dudgeon). *Exp.* 40 mill. *Type*—In B. M.

2180*a*. WESTERMANNIA CŒLISIGNA.—♂. Antennæ fasciculate; the basal joint with tuft of hair above, the base of shaft excised.

2180*b*. WESTERMANNIA EUPREPIA, n. sp.

♂. Head and tegulæ dark-chocolate; patagia and thorax grass-green; pectus pale; legs pale-brownish with dark band at end of tibiæ; abdomen orange, the terminal segments suffused with blackish, the ventral surface pale brownish. Forewing grass-green; the costal edge brown; a white discoidal lunule; the apical area brown from costa above discoidal lunule to tornus; an indistinct double postmedial line on the brown area, angled at vein 5 and with two dark teeth from it above the angle; faint traces of an irregular subterminal line with slight dark marks on it below apex, angled inwards on vein 6 and with faint greenish suffusion between it and postmedial line from vein 5 to below costa; a fine dark waved terminal line; cilia crenulate with dark tips. Hinding orange with brown suffusion on apical area.

Habitat—Cuddapah, Horsleykhonda, 4000′ (W. H. Campbell); Ceylon (Mackwood). *Exp.* 40 mill. *Type*—In B. M.

2186*c*. BREVIPECTEN APICALIS, Leech. Trans. Ent. Soc. 1900, p. 514.

♂. Antennæ ciliated.

Pale-red-brown and ochreous. Forewing with pale oblique antemedial line excurved to inner margin; the orbicular and reniform rather dark, or brown with pale rings, the former large, the latter very large, the postmedial pale line oblique from costa to vein 6, then excurved, incurved below vein 4, a large subquadrate dark-brown patch on its outer edge on costa with a point of the same colour below it, another point below vein 3 and larger spot below vein 2. Hindwing fuscous.

Habitat—China, Chekiang (Pryer); Burma Hsipaw (DeNicéville). *Exp.* 36 mill.

B. cosmiodes also belongs to this section.

2194*a*. TRIORBIS AUREOVITTA, n. sp. (pl. B., f. 16).

♂. Head and thorax dark red-brown; abdomen brown, yellowish towards base with dark dorsal tufts, pinkish towards extremity. Forewing red-brown shading to purplish and pink; a metallic golden fascia below the cell becoming ochreous and dark streaks along vein 2; an obscure, very irregularly dentate antemedial line; orbicular round, pale brown with tuft of dark scales in it; reniform similar but small, pear-shaped, emitting a long

tooth to the postmedial line which is ochreous defined by brown and very highly dentate towards costa and inner margin ; a sinuous submarginal ochreous line angled inwards at veins 5 and 2 and with dentate dark marks on its inner edge ; a fine waved ochreous line just inside margin and black line through cilia. Hindwing red-brown, costal area whitish ; a dark mark with pale line on it at tornus, underside whitish with dark discoidal lunule and diffused curved subterminal line.

♀. Thorax and abdomen darker, the latter with sides of basal segments distinctly yellowish. Forewing darker with the medial part of costal area and cell suffused with fuscous ; the fascia below cell streaked ochreous and blackish to base ; hindwing dark-brown.

Habitat.—Margharita, Assam (Doherty) ♀ ; Penang ♂. *Exp.* ♂ 56, ♀ 46 mill. *Type*—In B. M.

2196. ARIOLA CŒLISIGNA, insert (syn.) *Ariola ramsonneti*, Feld. Reis. Nov. pl. 108., f. 1.

2271*a*. EUTELIA DIAPERA, n. sp.

♀. Head and thorax variegated brown, black, and grey ; abdomen olive-grey with dorsal red-brown patch extending to 5th segment. Forewing grey suffused in parts with purplish and olive ; a purplish-brown mark at base of costa ; a straight antemedial line ; the orbicular and reniform grey with fuscous between them and a slightly sinuous line from former to inner margin ; a double postmedial line acutely angled above vein 5, then oblique and sinuous ; a curved dark mark from angle of postmedial line to outer margin below middle ; a waved white subterminal line excurved from costa to vein 3, then incurved ; a waved white line across apex with grey beyond it and a black spot on its inner side near termen. Hindwing fuscous-brown, the base of inner area whitish ; cilia white with waved fuscous line through them. Underside grey irrorated with brown ; forewing with minutely dentate postmedial line ; hindwing with discocellular point and dentate antemedial, postmedial and subterminal lines, the 1st angled outwards at middle.

Habitat.—Bhutan (Dudgeon). *Exp.* 28 mill. *Type*—In B. M.

2203*a*. PLOTHEIA VIRESCENS, n. sp. (pl. B., f. 25).

Hindwing with veins 3·4 on a long stalk, 5 from angle of cell.

♀. Head and abdomen grey ; thorax pale-green. Forewing white, almost entirely suffused with green ; an indistinct sinuous black subbasal line followed by black spots in and below cell ; double sinuous ante and post-medial lines, the former angled outwards above inner margin, the latter inwards below vein 2 ; a bright rufous discocellular spot ; an indistinct irregularly dentate subterminal line and a series of points on the termen. Hind-wing grey tinged with fuscous.

Habitat.—Sikhim, 7000′ (Pilcher). *Exp.* 26 mill. *Type*—In B. M.

2227*a*. PTISCIANA SCOTIA, n. sp.

♀. Red-brown; palpi at sides, fore-legs, and patagia blackish. Forewing suffused with black to the postmedial line and with a diffused streak from angle of the line to apex; tufts of greyish-black scales near base and at middle and end of cell; the antemedial line greyish, dentate and acutely angled outwards below the cell; the postmedial line defined by greyish scales becoming white towards costa, arising from costa before middle, very oblique to beyond angle of cell, then inwardly oblique and acutely angled inwards on vein 1, some fine black streaks from it on the subcostal veins; the subterminal line greyish and minutely dentate. Hindwing with the cilia whitish at tips.

Habitat.—Sikhim, 1800′ (Dudgeon). *Exp.* 34 mill. *Type*—In B. M.

2236*a*. HYPOTHRIPA VERNA, n. sp.

♂. Head and collar white-and-grey; palpi marked with brown; patagia and thorax variegated with purplish-brown-and-black; abdomen grey. Forewing grey, a large area on disc suffused with grey-green; a large rounded patch at base of costal area, yellowish-white at middle, then olive-green and edged by brown; a sinuous white antemedial line angled inwards on vein 1; a discocellular line; an irregularly dentate postmedial line, oblique to costa and with some black points on medial part of its inner edge; an irregular fuscous subterminal line; some black points on costa and termen. Hindwing pale-fuscous.

Habitat.—Sikhim, 1800′ (Dudgeon). *Exp.* 22 mill. *Type*—In B. M.

2236*b*. DENDROTHRIPA MACKWOODI, n. sp.

♂. Forewing with fringe of short pink hair on underside of costal vein; a fringe of long ochreous hair below the cell; hindwing with the costal area largely expanded and fringed with rough hair; the apex with large triangular excision; the discocellulars almost obsolete.

Head, thorax and abdomen pale-ochreous; frons with black bar above. Forewing greyish-ochreous, tinged with fuscous from costa to submedian fold to the postmedial line, the terminal area suffused with green; a blackish patch at the base of costa; a sinuous medial line from costa to submedian fold with black suffusion on its outer edge; the postmedial line strongly excurved beyond the cell, defined by whitish on outer side and with some vinous, then fuscous suffusion beyond its excurved portion; a sinuous subterminal line with some black suffusion in its medial sinus; some vinous suffusion on termen below apex and at middle; a fine terminal black line. Hindwing ochreous-white, the cell slightly irrorated with black scales. Underside with the costal area of both wings and terminal area of forewing tinged with pink.

Habitat.—Ceylon, Colombo (Mackwood). *Exp.* 18 mill.

2258. EUTELIA PICTICOLOR, insert (syn). *Ptisciana ioda*, Swinh., A. M. N. H. (7), 3, p. 114, Karwar.

No. 2258*b*. EUTELIA STICTOPROCTA belongs to Sect. III. with the antennæ strongly bipectinate.

2258*c*. EUTELIA CATEPHIFORMIS, n. sp.

♂. Head pale red-brown ; palpi dark at base ; thorax and abdomen fuscous-brown. Forewing dark red-brown ; the basal area blackish with traces of waved lines and two more prominent lines on its outer edge angled inwards above vein 1 ; an ochreous discoidal lunule ; a fine medial waved line very strongly bent outwards round the discoidal lunule ; a double similar more prominent postmedial line with small ochreous spot beyond it above vein 1 ; traces of irregularly waved lines on outer area and an obscure olive-yellow and dark fascia across apical area. Hindwing fuscous-black with white patch on basal half of inner area. Underside greyish with numerous minutely dentate dark lines on terminal area.

Habitat.—Naga Hills (Doherty). *Exp.* 30 mill. *Type*—In Coll., Elwes.

2274*a*. EUTELIA PICTATRIX, n. sp.

Head, thorax and abdomen brown-pink mixed with dark-brown scales ; abdomen with some blackish patches, the male with dorsal white patch on 4th segment. Forewing pink strongly mixed with dark red-brown scales ; very numerous waved fuscous lines ; double antemedial, medial, and postmedial lines rather more prominent, the 1st strongly curved, the 2nd bent outwards below costa, the 3rd excurved from below costa to vein 4 ; tufts of bright-red scales in cell near base, at middle and at upper angle ; pale wedge-shaped streaks on median nervure from before middle to the postmedial line, and in submedial interspace from near base to termen ; a short white streak below costa towards apex with an irregular dentate subterminal line from below it to inner margin ; a fine terminal black line and some blackish white-irrorated marks on termen from below apex to below middle, some similar spots on cilia. Hindwing yellowish-white ; the terminal half strongly suffused with fuscous from costa to vein 4, the veins on it black ; the submedian interspace pale ; vein 2 and the inner margin with alternating red and black marks ; cilia bright red-brown with fine pale line at base.

Habitat.—Ceylon, Gampola (Mackwood), Dickoya (Green). *Exp.* 32 mill. *Type*—In B. M.

2290*a*. STICTOPTERA LUCTUOSA, n. sp.

♀. Head and tegulæ fuscous-black ; thorax ochreous-brown ; abdomen fuscous. Forewing fuscous-black, the basal third pale brownish ochreous with a browner patch on it from costa to median nervure traversed by a black subcostal streak, the antemedial line just inside its outer edge ; the dark area with traces of numerous minutely dentate lines, the subterminal line with two ochreous marks on it below costa and one in submedian fold. Hindwing black-brown.

Habitat.—Ceylon (Mackwood). *Exp.* 42 mill. *Type*—In B. M.

2290*b*. STICTOPTERA NEGRETINA, n. sp.

♂. Black-brown. Forewing with a purplish tinge ; a waved antemedial black line ; a medial line oblique from costa to submedian fold, then erect,

the area between it and antemedial line black with three tufts of raised scales; a medial line from costa to median nervure, angled on subcostal nervure, two discoidal tufts of scales; a double sinuous post-medial line angled below costa and at middle; an indistinct highly dentate subterminal line. Hindwing almost black; underside with two indistinct medial lines.

Habitat.—Khásis. *Exp.* 32 mill. *Type*—In B. M.

2293*a*. GYRTONA CRISTIPENNIS, n. sp.

♀. Head whitish; thorax grey and brown, ochreous at extremity; abdomen greyish tinged with ochreous. Forewing violaceous-grey, the base and costal area tinged with ochreous; an oblique double dark brown costal striga near base; a whitish antemedial band with two slightly waved dark brown lines on it, the inner expanding into a diffused patch of scales in cell; a tuft of raised fulvous scales beyond the band in cell and another blackish below median nervure; the end of cell and costal area above it brown variegated with pinkish with some black striæ and a blackish discoidal tuft of scales defined by white lines; a large ochreous lunulate mark from costa beyond cell defined by a fine dentate black line on its outer edge; a subterminal line of white striæ and a terminal line of white and black striæ.

Hindwing semi-hyaline, the terminal half suffused with fuscous.

Habitat.—Khásis. *Exp.* 36 mill. *Type*—In B. M.

2332. CAREA XANTHIA, n. sp.

Forewing with the apex produced; the termen slightly angled at vein 4. Bright chrome yellow; palpi and antennæ red, the former white in front; pectus white; tibiæ and tarsi with red-brown and orange scales. Forewing slightly irrorated with black; a slight red and black streak on inner margin before middle; pale brownish spots in middle of cell, above middle of inner margin, on discocellulars and in submedian fold beyond middle; an oblique red-brown patch from apex with some white scales on it; cilia red-brown with some patches of white scales. Hindwing rather pale yellow with rufous suffusion from lower angle of cell to apex and middle of termen.

Habitat.—Sikhim, 1800′ (Dudgeon). *Exp.* 28 mill. *Type*—In B. M.

2358*a*. CATOCALA TRISA, Swinh., A. M. N. H. (7), 3., p. 115. (1899).

Head and thorax dark-fuscous-brown; abdomen yellow; pectus and ventral surface of abdomen whitish. Forewing dark brown; a short subbasal line; a double waved antemedial line, the outer stronger, especially towards costa; the postmedial line minutely dentate, very strongly angled below costa, less strongly angled on vein 3, then retracted to origin of vein 2 and outwardly oblique to inner margin; an obscure highly dentate curved subterminal line; the apex greyish. Hindwing pale yellow with fuscous band from costa just before apex expanding to termen between veins 6 and 2 where it terminates.

Habitat.—Bombay, Satara. *Exp.* 42 mill.

2450*a*. MELIPOTIS CAILINO, Lef. Ann. S. Linn., Paris 1827, p. 94, pl. 5., f. i.

Head whitish ; antennæ black ; thorax grey suffused with black ; abdomen grey irrorated with fuscous. Forewing with the base grey ; a short subbasal black line with a short streak from its lower extremity below the cell ; an antemedial black line sinuous and oblique from costa to submedian fold where it is angled, the area between it and the subbasal line blackish ; the medial area grey-brown, whitish towards costa on outer side of antemedial line ; the postmedial line very strongly excurved beyond the cell, angled at veins 6 and 4, and incurved between those points, then very strongly retracted to lower angle of cell and sinuous to inner margin ; a black line on discocellulars with some dentate white marks beyond it in the sinus of the postmedial line, the area beyond it blackish to the subterminal line which is angled outwards at vein 6 and excurved at middle ; the terminal area grey. Hindwing white suffused with fuscous ; a dark discoidal lunule with a white patch beyond it ; a white patch on termen at vein 2 ; cilia white with a black patch at middle. Underside of forewing with the basal half whitish, the terminal half fuscous with a white patch beyond the cell ; hindwing white with black discoidal lunule, postmedial band and black patch on middle of termen.

Habitat.—France ; Greece ; Armenia, Kashmir (Pilcher). *Exp.* 40 mill.

2532. *Serrodes inara.* Larva purplish white specked with black ; head and lateral band on thoracic somite flesh colour ; a flesh-coloured band on the swollen 4th somite with irregular black markings behind it ; dorsal, two lateral and sublateral interrupted waved flesh-coloured fasciæ on 5th to terminal somite. Pupa black with purple bloom. (Fellowes Wilson).

2535. SYMPIS RUFIBASIS. The specimen figured is a ♀, the ♂ has tufts of hair on extremity of 2nd joint and on 3rd joint of palpus and at base of antennæ.

2538*b*. BANIANA NODA, Swinh., A. M. N. H. (7), 3, p. 116 (1899).

Head yellowish white, the vertex, antennæ and tegulæ black ; thorax grey with a purplish tinge ; abdomen fuscous. Forewing reddish brown suffused with greyish purple and irrorated with black ; an antemedial black-brown mark from cell to inner margin with white outline, its inner edge sinuous, its outer angled on vein 1, traces of a fine line from it to costa ; a more or less prominent discoidal dark lunule edged with grey ; an obscure sinuous postmedial line ; some pale specks on costa towards apex ; a fine terminal series of dark points. Hindwing fuscous, the cilia brown.

Habitat.—Karwar ; Nilgiris. *Exp.* 38 mill.

2545. BOCULA *lutosa*, insert *Agrotis* INCONCLUSA, Wlk., Journ. Linn Soc. Zool., vi., p. 188, Borneo which has precedence.

2643. *Ophideres hypermnestra.* Larva : ♂ purplish fuscous speckled with blue; irregular blackish patches on thoracic and terminal somites ; stigmata with black points ; 5th and 6th somites with large lateral black ocelli ringed with red and yellow, 4th somite with lateral orange spot ; irregular yellow lateral marks on 7th and 8th somites and their prolegs.

♀ with the spot on 4th somite and the irregular marks on 7th and 8th pinkish-white. (Fellowes Wilson).

2697*b*. CALESIA CANESCENS, n. sp.

♀. Pale-grey-brown ; head, collar, thorax below, and abdomen crimson ; 3rd joint of palpi, antennæ, and tarsi black ; wings quite uniform grey-brown.

Habitat.—Sikhim, 1800′ (Dudgeon). *Exp.* 50 mill. *Type*—In B. M.

2705*a*. MECODINA CYANODONTA, n. sp.

♀. Rufous brown ; thorax except collar and abdomen suffused with bluish grey. Forewing with the basal half suffused with blue-grey ; fine indistinct waved rufous lines on basal area followed by a black point in cell ; an oblique medial rufous line ; reniform outlined with rufous ; outer half rufous with indistinct blue-grey line near its inner edge, excurved below costa, then very highly dentate ; darker rufous streaks in the interspaces of outer area ; traces of a waved subterminal blue-grey line below apex and some points towards tornus. Hindwing with the basal half suffused with blue-grey ; the outer half rufous with dark streak in the interspaces ; a blue-grey patch on termen at apex and some points towards tornus. Underside brown with traces of three darker lines on medial area.

Habitat.—Khásis. *Exp.* 44 mill. *Type*—In Coll., Elwes.

2710*a*. MECODINA SUBJECTA, Wlk., xxxiii, 1012.

♀. Yellow-brown ; head and collar grizzled with white ; thorax and abdomen tinged with fuscous and with grey below. Forewing with bisinuate fuscous antemedial line ; a whitish line on discocellulars ; a medial line highly excurved beyond cell, then oblique ; a postmedial oblique line angled below costa ; the outer area suffused with fuscous and with a deeper fuscous mark on costa before apex. Hindwing with fuscous antemedial line excurved below costa ; a medial line oblique towards inner margin ; an obscure bisinuate subterminal line ; the apical area suffused with fuscous. Underside with white suffusion beyond the postmedial line.

Habitat.—Bhutan (Dudgeon) ; Sierra Leone (Clements) ; Cape Colony. *Exp.* 52 mill. *Type*—In B. M.

The specimens from Africa are more suffused with fuscous than the one from Bhutan.

2729*a*. ZETHES STENIPTERA, n. sp.

♀. Dark-brown ; head and thorax slightly pencilled with grey ; tarsi and abdomen with greyish segmental lines. Forewing with dark antemedial line edged with ochreous on inner side, slightly curved and bent inwards above inner margin ; the postmedial line straight, hardly angled at middle and edged with ochreous on outer side, between it and the pale sinuous punctiform subterminal line suffused with purplish grey. Hindwing dark-fuscous, the underside irrorated with grey.

Habitat.—Sikhim, 1800′ (Dudgeon). *Exp.* 28 mill. *Type*—In B. M.

2737. ZETHES NIGRILINEA, insert (syn.) *Zethes ochrodes*, Swinh., A. M. N. H. (7), 3, p. 115.

2738*a*. ZETHES APICATA, n. sp.

♂. Head and thorax dark-purple-brown; abdomen pale ochreous-brown. Forewing pale ochreous-brown with numerous pale striæ and irrorated with a few black scales; a subbasal purple-brown band edged by rufous lines; the postmedial line angled at vein 5, dark brown above that point, pale below it; a quadrate purple-brown apical patch extending nearly to cell and to vein 4 with an oblique pale mark on it from costa; a pale crenulate subterminal line and almost terminal series of points. Hindwing pale greyish brown; two discoidal points; a medial pale line defined by brown on outer side, the area between it and the crenulate postmedial line reddish; some black spots on the postmedial line towards inner margin; a subterminal series of small lunules; a fine pale terminal line.

Habitat.—Khásis. *Exp.* 30-32 mill. *Type*—In B. M.

2740*a*. ZETHES MACARIATA, Dudgeon. Ined.

♀. Pale-ochreous tinged with pale-rufous in parts and irrorated with a few dark scales; palpi and antennæ blackish. Forewing with two indistinct curved and waved antemedial lines; a black point in middle of cell and white discoidal bar with somewhat excised outer edge; a pale highly sinuous medial line running out to an angle below costa and with bluish-white suffusion between it and the postmedial line becoming almost white near costa; the postmedial line angled outwards below costa and at middle and bent outwards to inner margin, the area beyond it red-brown with a whitish patch at apex and traces of a subterminal series of black points. Hindwing with indistinct subbasal line angled at middle; a sinuous medial line with red-brown suffusion on its inner side; an indistinct curved and slightly waved postmedial line; a very indistinct sinuous subterminal line with dark red-brown patch beyond it towards tornus with three black points on it, the termen straight from apex to the angle at vein 4.

Habitat.—Sikhim, 1800′ (Dudgeon). *Exp.* 48 mill. *Type*—In B. M.

2738*a*. CAPNODES PURPURNA, n. sp.

♂. Dark purple-red; abdomen blackish above towards extremity. Forewing with small oblique fulvous spot below middle of costa; black point in cell and two grey points on discocellulars; a small white lunule on costa beyond middle and three points towards apex; a treble black and brown line from apex to middle of inner margin of hindwing; both wings with minute series of white points just inside termen.

Habitat.—Khásis. *Exp.* 34 mill. *Type*—In B. M.

2769*a*. DIOMEA LIVIDA, n. sp.

♂. Head black; thorax rufous, the tegulæ ochreous in front; abdomen fuscous, the dorsal tufts rufous, the anal tuft ochreous. Forewing purplish brown, the costal area suffused with reddish-ochreous; small subbasal and antemedial black spots defined by whitish on the costa; traces of an antemedial line on inner area and of a double line just beyond the middle; a large deep black discoidal lunule with diffused black above it on costa; a

crenulate black postmedial line with white points on its teeth ; an irregularly sinuous subterminal line with the area beyond it deeper red-brown. Hindwing pale brown suffused with fuscous to the indistinct postmedial crenulate line which has some white points on it ; an irregularly sinuous subterminal line with the area before it pale purplish grey, beyond it red-brown ; both wings with terminal series of small ochreous spots with black striæ on their inner side. Underside greyish irrorated with fuscous with black cell spots and medial and postmedial lines.

Habitat.—Simla (Pilcher). *Exp.* 36 mill. *Type*—In B. M.

2785*a*. AVITTA INSIGNANS, n. sp.

♂. Head and thorax brown ; abdomen grey-brown. Forewing brown suffused with purplish grey, the basal area brown ; two indistinct fine oblique antemedial lines ; a diffused medial line not reaching costa ; an obscure discoidal lunule ; two fine sinuous indistinct postmedial lines followed by a diffused band not reaching costa ; a waved subterminal line and some diffused brown on termen. Hindwing fuscous. Underside grey with an ochreous tinge ; forewing fuscous except the costal and terminal areas ; hindwing with slight discoidal lunule.

Habitat.—Khásis. *Exp.* 48 mill. *Type*—In Coll., Elwes.

2785*b*. AVITTA PASTEA, n. sp.

♀. Head and thorax dark-brown, the scales pencilled with pale brown ; palpi paler ; tarsi with ochreous rings ; abdomen black-brown. Forewing dark red-brown, finely irrorated with grey forming a large patch on costal area from end of cell to apex ; two obscure waved antemedial lines incurved below cell ; a nearly straight medial line ; a discoidal spot ; two minutely dentate postmedial and a subterminal line. Hindwing blackish with a bluish tinge, the cilia grey. Underside grey with discoidal lunules and curved postmedial lines.

Habitat.—Sikhim, 1800′ (Dudgeon) ; Margharita, Assam (Doherty). *Exp.* 46 mill. *Type*—In B. M.

2889*a*. TALAPA ACYPERA, n. sp.

Forewing with the outer margin very acutely angled at vein 4.

♂. Head, tegulæ and base of patagia and meso-thorax pinkish grey-brown ; the rest of thorax dark rufous ; abdomen pinkish grey. Forewing pale irrorated with brown ; an oblique antemedial pink line defined by rufous on outer side and with diffused rufous beyond it ; dark points in cell and on discocellulars ; a curved slightly sinuous postmedial pink line defined by a fine rufous line on inner side and with diffused rufous beyond it ; an oblique streak from apex with an oblique rufous line from below its extremity to tornus ; a slight series of terminal points. Hindwing ochreous suffused with fuscous with traces of medial and postmedial lines ; underside with discoidal black spot.

Habitat.—Khásis. *Exp.* 40 mill. *Type*—In B. M.

2912*a*. RHYNCHINA ALBILUNA, n. sp.

♂. Pale ochreous-brown ; abdomen whitish at base. Forewing with slight black suffusion just beyond end of cell ; a white lunule on inner area just beyond middle ; a subterminal line, finer highly dentate and whitish from costa to vein 4, then strongly incurved, blackish and diffused ; a fine pale line at base of cilia. Hindwing pale brownish ; the terminal area fuscous.

Habitat.—Sikhim, 2800′ (Pilcher). *Exp.* 28 mill. *Type*—In B. M.

2985*a*. HYPENA UMBRIA, n. sp.

♂. Dull ochreous-brown ; palpi black ; meta-thorax with blackish patch ; wings irrorated with fuscous. Forewing with blackish patch at base ; a small black spot in cell and eliptical discoidal spot with brownish centre ; traces of waved antemedial and medial lines and a more distinct subterminal line with blackish patch on its inner side towards costa ; a terminal series of black points. Hindwing with discoidal point and indistinct waved medial, post-medial and subterminal lines ; the terminal area suffused with fuscous ; a terminal series of black points.

Habitat.—Ceylon, Puttalam, Maturatta (Pole). *Exp.* 20 mill. *Type*—In B. M.

2998*a*. CHUSARIS SEMIALBA, n. sp.

Head, thorax and abdomen greyish white ; palpi, pectus, and ventral surface of abdomen black, the last suffused with fuscous above towards extremity. Forewing with the basal half greyish white ; a dentate antemedial dark line ; a sinuous medical line angled at lower angle of cell ; a waved postmedial line bent outwards at middle ; the apical third of wing greyish brown from middle of costa to inner margin beyond postmedial line ; a waved subterminal line with some black marks beyond it. Hindwing white with medial brownish band not reaching costa irrorated with black and with waved black edges ; terminal area brown with white line and black and white marks on it. Underside blackish.

Habitat.—Sikhim, 1800′ (Dudgeon); Rangoon. *Exp.* 20 mill. *Type*—In B. M.

3000*a*. CHUSARIS NIGRISIGNA, n. sp.

♂. Dark grey-brown ; palpi blackish, the 3rd joint ringed with white. Forewing irrorated with blue grey and black scales ; small dark basal and antemedial spots on costa ; a larger black spot in end of cell with some spots above, beyond and below it ; a subtriangular black patch on costa before apex, some points on termen. Hindwing fuscous, the inner area greyish brown with some black striæ.

Habitat—Sikkim, 1500′ (Dudgeon). *Exp.* 22 mill. *Type*—In B. M.

Section II. Palpi extending about three times length of head ; forewing with vein 7 stalked with 8·9·10 and 11 approximated to them at middle ; hindwing with veins 3·4 and 6·7 stalked ; the costa somewhat excised beyond middle.

3008c. PROLOPHOTA BISIGNATA, n. sp.

♂. Ochreous-white ; palpi, abdomen and wings irrorated with a few black scales ; meta-thorax with prominent black patch. Forewing with the costa blackish towards base ; an antemedial series of four minute points angled in cell ; two prominent obliquely-placed discoidal points placed on an obliquely curved fuscous band with rather darker edges and not reaching costa on which there is a black point ; a pair of prominent postmedial spots below costa and two points between veins 3 and 5 ; a subterminal series of points. Hindwing with slight discoidal point ; a slightly sinuous brownish medial band edged by black lines and not reaching costa ; traces of a postmedial line ; a subterminal series of black points.

Habitat.—Ceylon, Pundaloya (Green). *Exp.* 24 mill. *Type*—In B. M.

SNAKE VENOMS: THEIR PHYSIOLOGICAL ACTION AND ANTIDOTE.

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(*Read before the Bombay Natural History Society on 21st January 1902.*)

At a recent meeting of our society Mr. Phipson and Father Dreckman showed us the beautiful collection of snakes, which, as a rule, is kept shut up in a cupboard. On this occasion Mr. Phipson indicated to us the way by which naturalists tell a poisonous from a non-poisonous snake: he also told us about the structure of the poison apparatus and about the mechanisms by which the so-called erection of the fangs and the ejection of the poison take place. It is, therefore, unnecessary for me to again enter into these most interesting subjects. Further, Father Dreckman told us, that, although there are many varieties of poisonous snakes in India, there were only four terrestrial snakes which could be said to offer any danger to man, and that naturalists put these four into two great groups, *viz.* (1) two of the Colubrine family—the Cobra and the Kraits; (2) two Viperine, *viz.*, Russell's Viper or Daboia and Echis Carinata or Phoorsa. This evening I propose to tell you something about the nature and physiological action of the venoms of these snakes. At the outset, however, I should like you to understand that my remarks on this subject will be strictly confined to a summary of the observations which I have made with the poisons of the two most deadly of these snakes, *viz.*, the Cobra and the Daboia. I have little or no experience of the poison of the Kraits or that of the Echis, nor do I know of any thoroughly trustworthy scientific observations which have been made with the venoms of these two species. And let it be clearly understood, that, although the Krait is a Colubrine snake and the Echis a viper, it by no means follows, as I have good reason to know, that the poison of the Krait has the same physiological action as the venom of the Cobra or that of the Echis the same as the venom of the Daboia.

On the Method of procuring the Poison for Experimental Purposes.

All the older experiments with snake venom were made by allowing the snake to bite some animal or other. This method is, of course, a crude one and affords us no information as to the amount of poison which a snake can inject nor as to the exact quantity which can prove lethal to a given animal. Nowadays all investigators

work with dried and weighed quantities of venom. The poison may be collected in one of two ways: (1) the snake is caught by means of a guillotine arrangement or a strong pair of forceps behind the neck. If these are not available, a trained snake-man will serve the purpose equally well. The animal, caught in either of these ways, is then securely held with one hand behind the head. The lower jaw is then forcibly opened by catching the skin covering it. The fangs become erected and the duct continuous. In the case, however, of the Daboia, which has exceptionally long fangs, it is well to pass a piece of string behind them and pull them forward with this. With the finger and thumb of the other hand firm and steady pressure from behind forwards is made over the glands situate behind the orbits. The poison escaping from the fangs is caught in a watch-glass held by an assistant in a pair of long forceps. The process is, you will understand, a process of squeezing, not, as we sometimes call it, one of "milking;" (2) the snake, held securely behind the head, is allowed to bite through a piece of rubber stretched over a watch-glass or other suitable receptacle. The liquid poison is then quickly and thoroughly dried over lime or sulphuric acid. I have carefully estimated the average amount of venom which can be got in this way. I find that a medium-sized Cobra, that is, one from 500 to 1,000 grammes weight ($\frac{3}{4}$ to $1\frac{1}{4}$ lbs.), will yield about 200 milligrammes of dried poison; the larger-sized Cobras will give as much as 240 to 250 milligrammes or even more.* The amount of water contained in fresh liquid cobra poison varies from 60 to 75 per cent., so that fresh cobra venom is a 25 to 40 per cent. solution of the dried material.

Let us say that a Cobra gives 200 milligrammes of dried venom. This is sufficient to kill 5,000 ordinary rats. It is, of course, without actual experiment, impossible to say how much Cobra venom it takes to kill a man; but, calculating this amount on the basis that man is as susceptible, weight for weight, as a rat, and from my experiments on mice, rats, rabbits, monkeys, and horses, I have no reason to think that he is less susceptible, then 200 milligrammes of poison—the amount which can easily be got from a Cobra—would be sufficient to kill eight ordinary-sized men, that is to say, that a medium-sized Cobra can inject eight times the quantity, which would be sufficient to kill a man. A large Cobra would have ten times the necessary amount.

* 1 milligramme=·015 grain, or about $\frac{1}{66}$ part of a grain.

Physical and Chemical Properties of Venom.

Fresh liquid poison is of a yellowish or straw colour. Cobra venom is quite clear, while Daboia poison has, as a rule, a small quantity of undissolved suspended matter. The reaction of both venoms is invariably acid to litmus paper, unless there has been much admixture with the alkaline secretions of the mouth. Cobra venom has a very bitter astringent taste ; chewing Daboia venom is like chewing ordinary gum acacia—there is no taste at all.

Venom dried rapidly in a thin layer over calcium chloride cracks into small pieces. In the case of Cobra poison these particles are of an irregular shape, as broad as they are long ; they are yellowish and translucent. In the case of Daboia venom the cracking is more or less in longitudinal striæ, and, in consequence, fine needle-shaped particles are found. I show you here good specimens of both these varieties of snake venom.

Thoroughly dried venoms retain their toxic power for an indefinite period. They dissolve again readily and completely in water or salt solution.

It is quite unnecessary for me to enter into the complicated question of the chemical constitution of these poisons. At one time, not very long ago, it was thought that the toxic constituents of all snake venoms were alkaloids, similar to the poisonous vegetable alkaloids, such as strychnine. This, however, has been shown to be an entirely erroneous supposition ; and I think I am right in saying that all investigators are agreed that all snake venoms owe their poisonous properties to the proteid or albuminous substances which they contain in solution—substances similar in composition to the albumen or white of egg. All snake poisons are, in fact, almost pure solutions of proteids, and contain little else beyond a trace of inorganic salts and a small quantity of an organic acid and colouring matter. Further, there is no doubt that each venom contains two or more different proteids, and that the physiological action of a particular venom depends on the nature of the proteids which it contains. Organic chemistry has, unfortunately, not advanced far enough as to be able to separate in pure form these various proteids or to arrive at any estimate of their chemical constitution. We have, therefore, to content ourselves at present with various crude methods of studying the physiological actions of the different proteids in snake venoms.

Effect of heating Snake Poison.

When a solution of snake venom is heated the poison is affected in two ways:—

(1). Some of the proteids present become coagulated, in the same way as the albumen of egg is coagulated for breakfast.

(2). The toxic power of the proteids which are not coagulated is impaired, while their solubilities are not altered.

Whether the toxic power is completely destroyed by heating or not depends on the degree of heat used, the duration of time for which it is applied, and the strength of the solution which is heated. Different poisons are affected in different ways. Thus, while a 0·1 per cent. solution of Cobra venom can be heated for half an hour at 73° C., with the result of only slightly diminishing its original toxicity, heating a 0·1 per cent. solution of Daboia venom at the same temperature for the same length of time completely destroys its toxic power, so that large quantities can now be introduced into the blood stream of an animal without causing any symptoms.

You will appreciate from this, then, that we have arrived at the stage when we can say that the poison secreted by a Cobra is, in all probability, of quite a different nature from the venom manufactured by a Daboia. In this connection I may say, without entering into tedious details and long explanations, that I feel to-day in a position to state, without fear of contradiction, that Cobra venom contains no poisonous element which is contained in Daboia venom, and *vice versa* that Daboia venom is necessarily quite free from any of the toxic constituents of Cobra poison. I know that this opinion is in contradiction to the working hypothesis put forward by Martin of Melbourne some years ago—an hypothesis which, however, was only provisional and fitted to the facts then available.

Physiological Action of Venoms.

We have, therefore, now to pass on to a brief consideration of the manner in which each of these venoms brings about its fatal result when injected into an animal.

Let us begin with Cobra venom, the poison which has received more attention from investigators than any other. If one injects a solution of Cobra venom into a hot-blooded animal, no matter what the species of the animal may be, one observes a train of symptoms which there is no doubt points to the poison having acted directly

on the central nervous system, that is, the spinal cord and brain. The animal after a while becomes lethargic and disinclined to move; there is no preliminary stage of excitement: then one observes that the hind legs have become paralysed, the animal drawing them after it when endeavouring to progress. The paralysis of the hind legs gradually becomes more marked, while at the same time the paralysis spreads forwards and involves the forelegs. Ultimately the animal becomes completely paralysed and lies down unable to move. The breathing still continues. Thus one sees in all such experiments a most striking and typical picture—the animal, be it bird or mammal, mouse or horse, lying on the ground completely unable to stir, the breathing still going on, and the saliva trickling from its mouth.

This, however, does not last long. The paralysis soon involves the respiratory centres; gasping in the search for air becomes marked, and the scene is closed with the total cessation of respiration. Just before this, however, there may be slight general convulsive movements, due to the accumulation of carbonic acid gas in the system. Mark you, there has been no word of failure of the heart; there has been no diminution in the strength of the pulse. After the breathing has completely stopped, if one opens the chest, one sees the heart beating away as if nothing had happened. I have observed this beating go on for twenty minutes to half an hour after the chest has been laid open and gradually to become weaker and weaker and ultimately cease altogether.

As well as this action on the central nervous system, Cobra venom has got an action on the blood. It has got a very wonderful power of breaking up the red corpuscles of the blood, with the result that a certain amount of the colouring matter is set free. Thus, when a sample of the blood is taken into a test-tube after death and allowed to clot, the serum is noticed to be dark-red in colour, due to the hæmoglobin which has been set free. Further, Cobra venom has an action on the normal coagulability of the blood, that is to say, on the property which blood has of coagulating or setting when withdrawn from the vessels. The clot which forms is not so firm or so compact as in normal blood, and the time which it takes to form is much lengthened. As far, however, as my experiments have shown me, I cannot find any possible relation between the nervous symptoms which I have described and this action which Cobra poison has on

the blood. This conclusion is, I know, contrary to the opinion of Cunningham who, however, is the only observer who contends that the action on the blood is the primary one, and that the nervous symptoms are dependent on and result from this destruction of the blood cells. This is a long and complicated story and one which, I hardly think, would give us much profit to pursue at this time.

If Cobra venom be injected directly into the blood stream—into a vein, for example—the same train of symptoms as I have described above is observed, the only difference being that the symptoms come on more quickly and march to a fatal termination much more rapidly than when the injection is given under the skin.

When a man is bitten by a Cobra, the same general symptoms, which I have sketched above as following the artificial injection of the poison into an animal, are observed. As well there is, as a rule, at the beginning sickness and vomiting and a feeling of lethargy and disinclination to work; paralysis, however, soon sets in, and life ends, as we have seen, by cessation of respiration.

In addition to these general symptoms, however, there are marked signs of poisoning locally at the site of the bite. There is very severe pain which follows immediately on the infliction of the wound. The parts around become swollen and tender, and a bloody serum oozes away from the punctures. If the bite has been inflicted on a dependent part, such as a finger, the swelling spreads up the digit which soon becomes exceedingly tense and extremely painful. Should the patient ultimately recover from the general condition, the tissues for a short distance around the bite die, a black slough forms, and on separating leaves a deep hole. This hole heals up very slowly, and there is left an ugly depressed scar.

To complete the picture, I may state that in man the general symptoms, as a rule, do not set in for an hour or two after the bite, and that on the average death takes place about three to six hours later. The fatal result, however, may be accelerated, or, on the other hand, it may be delayed for some considerable time, even a day or two, according to the amount of poison which has been injected. You will appreciate, nevertheless, that we have got in all cases a certain interval of time, as a rule some hours, between the bite and the onset of symptoms and death—an interval of time precious, indeed, as you will see, when I come to speak of the treatment of these cases.

Such, then, is a short sketch of Cobra venom intoxication. We may now pass on to the consideration of the effects of an injection of the venom of Russell's Viper or Daboia. . Experiments with this poison and clinical observations on actual cases show quite a different picture to what I have described in the case of Cobra venom. I have had the privilege of studying the action of Daboia poison on many varieties of animals—mice, rats, fowls, pigeons, guinea-pigs, rabbits, monkeys, dogs and horses. At the outset it would be well to clear the ground by stating that, as far as my experience goes, it would appear that Daboia venom has no direct action on the central nervous system. I have never seen paralysis of the legs, even in the prolonged cases, follow its injection. The respiration is only interfered with as a result of its action on the blood and heart. Its action seems to be confined entirely to the circulatory system, *viz.*, the blood plasma—that is, the fluid part of the blood,—the blood corpuscles, the capillary walls and the heart.

We may divide all cases of Daboia intoxication into two groups—

(1) those cases in which death follows very rapidly—say, within 10 or 15 minutes or sometimes it is only a few seconds—after the injection of the venom ; and

(2) those cases in which death is prolonged for some hours or even some days after the injection of the poison.

Let us take the first group.

When a small quantity of Daboia venom is injected directly into the blood stream of an animal—say, into the marginal vein of the ear of a rabbit,—or when a comparatively large quantity is put under the skin,—say, of a pigeon,—death follows rapidly, sometimes in a few minutes. You will notice that the animal first becomes unsteady on its legs, its powers of equilibration are seriously affected ; then it falls down, and almost immediately violent convulsions set in. Death follows in a few seconds after the onset of these convulsions. From the observation of these symptoms Cunningham was led to believe that they resulted from the direct action which the poison had on the central nervous system. This, however, I have shown to be quite an erroneous hypothesis. What, then, has really taken place? On opening the animal immediately after death, if the dose has been at all a large one, the whole of the blood is found to be clotted solid ; the cavities of the heart, the veins of the lungs and abdomen, and even

the arteries are found full of solid clot. The heart has, of course, ceased to beat. If the dose has been a smaller one, the clotting may be confined to the pulmonary arteries, the right heart and the portal veins. The degree and extent of the clotting depend on the amount of venom injected and the rapidity with which it has been injected. But, in all cases of rapid death resulting from Daboia intoxication, there can be no shadow of doubt but that the fatal result has been caused by this most extraordinary and remarkable intravascular clotting. The symptoms which Cunningham interpreted as resulting from a direct action of the poison on the central nervous system are due to carbonic acid poisoning, the result of the non-aëration of the blood in the lungs.

In the second group of cases, *viz.*, that in which death is delayed for sometime, we have several different phenomena presenting themselves.

In the first place, death may follow in a few hours after the injection. In such a case the fatal result is, I am sure, due to the depressing action which the poison has on the heart. Thus I have seen a horse, which had received into a vein a quantity not sufficient to cause clotting, fall down quite collapsed ; its pulse has become feeble, hardly to be felt ; its body cold and covered with perspiration—a typical picture of cardiac depression or syncope, known popularly as a faint. There was no paralysis : after a rest the animal got up and walked about, only, however, to fall down again in another faint. This condition sometimes ends in death, while, on the other hand, it may be recovered from.

In the second place, should the fainting condition be recovered from, then a whole series of phenomena develops, which is dependent on the action of the venom on the blood corpuscles, the coagulability of the blood and the capillary walls.

I have told you that when large doses are given either intravenously or subcutaneously, the coagulability of the blood may become so increased as to lead to rapid intravascular clotting and death. Should, however, the quantity be not sufficient to cause this clotting, and especially will this be the case if the subcutaneous method of injection has been used, then the very opposite condition of blood coagulability results. In some cases the blood remains absolutely unclotted when drawn into a test-tube, while in others it clots only after a long interval of time, and the clot is very loose and soft. As

well as this action on the coagulability of the blood, Daboia venom, somewhat similar to Cobra venom, has a very marked destructive effect on the red-blood corpuscles. Further, Daboia venom has a great destructive action on the capillary walls, making them more permeable to the blood they contain—a blood by its deficiency in coagulability more ready to exude out. As a result of these various effects on the blood and capillary walls, it comes about that bleeding is very common in these chronic cases of Daboia poisoning. Thus, around the site of the actual punctures or injections in experimental cases there are a large bloody extravasation and much swelling. This swelling spreads rapidly up the limb. The tissues all around the place of injection die and offer a suitable pabulum for all sorts of bacteria. Thus it happens that death in these cases usually results from some bacterial poisoning, such as malignant œdema or general septicæmia. As well as this local action hæmorrhage may take place from every orifice of the body—from the nose, from the mouth, from the bowel, or from the kidneys and bladder. The blood is in a fluid condition and clots badly, while the destruction of the small vessel walls allows of it to exude easily. The blood-stained fluid which exudes contains few red corpuscles; the colouring matter of these has been dissolved out and now stains the plasma.

Such, then, is the picture of a typical case, either actual or experimental, of chronic Daboia intoxication, and it is this state which is usually seen to follow the bite of a Daboia in the human subject.

This condition can be and often is recovered from, the great danger being, as I have indicated, a secondary bacterial infection.

Thus, while I have said that a man bitten by a fresh medium-sized Cobra, if the snake succeeds in injecting even a modicum of its poison, will invariably die if left untreated, it often happens that authentic cases of bites from Daboia recover, even after serious hæmorrhages have occurred from many places. As I have said, I have never seen paralysis in all my experiments with Daboia venom, nor can I find any authentic record of such having occurred in actual cases.

To sum up, then, it would appear that Daboia poison acts mainly, if not entirely, on the circulatory apparatus—

(1) It affects the coagulability of the blood. Injected directly into the blood stream, or in large doses under the skin, it so increases

this as to cause extensive intravascular clotting. In small doses it causes, after no doubt a short-lived phase of increased coagulability, a marked and prolonged phase of diminished coagulability, so that in some instances I have noticed the shed-blood remain absolutely unclotted even after 24 hours.

(2) It has a destructive action on the red-blood cells, breaking these up and setting free the colouring matter contained in them.

(3) It has a marked destructive action on the capillary walls, rendering them more permeable to their fluid contents.

(4) It has a marked depressing action on the heart, so marked, indeed, as to sometimes lead to a fatal termination from this action alone.

(5) It has no action on the central nervous system; and there is therefore no paralysis ever observed.

Such then, as far as I know it, is the physiological action of the venom of the Daboia Russellii.

As regards the Bungarus, or Krait family, I have had little or no experience. From a few experiments recently made with the poison of Bungarus fasciatus, it would appear that in large doses this venom has the property of causing intravascular clotting, while in smaller doses it causes paralytic symptoms similar to, but more prolonged than, those resulting from Cobra venom. Beyond this I cannot go for want of material.

With the poison of the Echis carinata I have, from lack of venom, made no experiments whatever.

The Treatment of Cases of Snake-bite.

In conclusion, I have a few words to say as regards the treatment of cases of snake-bite. When we consider the terribly dramatic, even tragic, circumstances attending these cases, it is not to be wondered at that the treatment of cases of snake-bite has been surrounded by all kinds of quackery and roguery, especially in a country like India, where the people's emotional reflexes are easily stimulated to belief. Who has not heard of the method, still in vogue, of applying the cloacæ of fowls to the bite? One after the other the fowls mysteriously die almost as soon as the application is made, until there is arrived a time when the poison has all been "sucked out"

and the fowls no longer die. Who has not heard of the magic stone, of the virtue of *nêm* leaves, both when locally applied and when internally administered, of spells and incantations? What remedy has not been tried and vaunted as a specific for these cases? Strychnine, alcohol, pushed to cause helpless drunkenness, &c., have all at various times been praised and put forward as absolutely infallible. All these methods and drugs, and many others besides, have had, however, to give way before the test of scientific research. While, however, scientists have so ruthlessly demolished all these so-called specifics, they have given us a remedy, certain and trustworthy, for at least all cases of Cobra bite. I speak, ladies and gentlemen, of the anti-venomous serum prepared by Dr. Calmette of Lille, which can be procured and easily used by any one. I have carefully guarded myself by saying that this serum is useful at least for all cases of Cobra bite, for while Martin of Melbourne has shown that it has little or no power to neutralise the poisons of two poisonous Australian snakes, *viz.*, *Pseudechis* and the dreaded *Hoplocephalus*, I have demonstrated in many experiments with different animals that it is of no avail whatever in counteracting the poisonous effects of Daboia venom. I have not yet tested it with the venom of the Krait family or with that of the Echis, but from *á priori* reasons it is almost certain that it would have no power whatever to neutralise either of these poisons.* But it is a great step in advance that we have at hand an antidote to the venom of the Cobra, certain and reliable if properly administered. If such is possible to obtain, then we have hopes, amounting almost to certainty, that anti-toxic sera will ultimately be obtained for the poisons of our other snakes. Such, then, is the position of the question at the present day as far as our Indian snakes are concerned. I am quite aware that Calmette claims that his serum is equally effective against every kind of snake venom. But Martin, Cunningham, Stephens, Hanna and myself have shown beyond a doubt that this statement is an untrue one and must be considerably modified. As regards the reasons for this opinion, both *á priori* and experimental, it is unnecessary for me to enter into any polemical discussion. I have already done that elsewhere.

NOTE.—Since writing this I have made some series of experiments with Calmette's serum and the venom of *Bungarus fasciatus*. These experiments, which are in process of publication, definitely show that this serum has no neutralising action with this venom. My *á priori* reasoning was, therefore, correct.

What, then, is this serum, and how and in what doses is it to be administered?

You are, no doubt, aware that an animal reacts to the injection or some toxins or poisons, if the dose is not a fatal one, by manufacturing in its body an anti-toxin, that is to say, a substance which is chemically antagonistic to the toxin, and which by combining with the toxin in some obscure way or other forms a substance which is no longer poisonous. This action is, as far as we know, quite specific. Thus the anti-toxin got by injecting an animal with a toxin called A will neutralise that toxin A and not toxin B, no matter how closely allied these two toxins may be to one another. Further, there are only some poisons to which animals react in this way. Among these may be mentioned the poisons manufactured by the diptheria and tetanus bacilli, the vegetable poison abrin and the venom of the Cobra and possibly of other snakes.

The method, then, of preparing an anti-toxin is to inject an animal with a small non-fatal dose of the toxin to which an antidote is desired. Some small amount of anti-toxin is then prepared by the animal. This enables the animal to stand a larger dose of toxin the next time. In this way, by gradually increasing the dose of the poison at each injection, and by allowing a sufficient interval of time between each injection for the formation of more anti-toxin, the animal becomes immunised, that is to say, becomes able to stand enormous doses of the toxin, each of which doses would represent many times a single fatal dose for an untreated animal. To get an animal up to this state of immunity requires a long time, six months to a year and in some cases even longer. Calmette takes 18 months to two years to immunise his horses. No one knows how and where the antidote is manufactured. But what is important is, that this antidote is present in considerable quantity in the circulating blood. All that has to be done then is to tap the animal and collect the blood. The blood is allowed to clot, and the clear fluid or serum which exudes from the clot contains the anti-toxin desired.

Horses being large animals and yielding a large quantity of blood at one time without damage to themselves are, as a rule, the beasts employed for this purpose. You will, perhaps, be astonished when I tell you that a horse can be bled to the extent of a gallon or more without doing it the slightest injury.

If you have followed me in this rather technical explanation, you will now understand that anti-venomous serum is the serum of a horse which has been immunised with snake venom, that is, a horse which has been treated over a length of time with gradually increasing doses of venom. The serum thus got is put up into small bottles containing 10 cubic centimetres * each.

What, then, is the method of administration of this antidote, and in what doses should it be given ?

In the first place, it is necessary for you to understand—and, if you have followed me so far, you will understand—that to be of any good whatever the anti-venomous serum must come into actual contact with the venom. Now after a man is bitten by a snake the poison is rapidly absorbed from the side of the bite and circulates freely in the blood. Our aim, therefore, is to get the serum as quickly as possible into the blood stream, if possible before the poison has done any damage to the central nervous system, in other words, before any symptoms have appeared.

This, of course, can be easily done by injecting the serum directly into a vein, such as a vein at the bend of the elbow. If competent medical assistance is at hand, I should certainly advise all cases of Cobra bite being treated in this way. Less serum is required, and the results would be more satisfactory. But, unfortunately, in these cases such assistance is not usually available. We have then to fall back on injecting the serum under the skin and allowing it to be absorbed into the blood from there, a process which Martin has shown occupies a considerable time. The best site for injection is, I think, the loose tissues of the flank. A large quantity of serum can be injected there, if the needle is plunged deeply enough, without giving the patient the slightest inconvenience. If time permit, the syringe should be boiled before being used; but if symptoms have already developed, this preliminary boiling may be dispensed with.

As to the dose to be injected, Calmette contends on very slender, in fact on empirical grounds, that from 10 to 20 cubic centimetres, that is, from one to two bottles, is sufficient for any case of Cobra bite. In my opinion—and I speak from a large experimental experience with this poison, as well as from some most interesting observations which I

* A cubic centimetre is about 16 to 18 drops.

was privileged to make recently on an actual case of Cobra bite at the laboratory at Pare—this dose would in many cases fail to save the life of the patient.

A short account of this case might perhaps interest you. An officer of the laboratory, while assisting in extracting the poison from a full-sized Cobra, put his fingers where he had no business to, that is, in the neighbourhood of the snake's mouth. In a moment the animal had buried one of its fangs in the point of the right thumb. The thumb was at once withdrawn, but not before the total amount of poison in the gland had been injected. The symptoms, both objective and subjective, &c., which followed, were carefully noted as they occurred. Locally there was much pain at the site of the injection. Swelling of the parts soon began and gradually became well marked. A bloody serum oozed out from the puncture and continued to do so for 24 hours.

Fortunately for the experiment no fresh serum was available, and we had to inject two bottles of a serum which had been the property of this Society and which was at least four years old. Just the week previous to the accident I had tested this serum with Cobra venom on rats and had found that it had little or no neutralising power. The patient then went on with his work. About three hours after the bite he began to get lethargic and lazy, did not wish to work and preferred to lie down. This was soon followed by sickness and violent vomiting. Then he noticed that his legs were weak, he was unable to move about and had perforce to adopt the prone position. It appeared then that the serum had had little or no effect and that the case was hopeless. Just at this time, however, some fresh serum arrived. Ten cubic centimetres were at once injected and the symptoms watched. In about half an hour the paresis of the legs showed signs of improvement. A short time later our patient was able to walk away and drive to the club. Locally, the pain and swelling continued for some time. A small slough formed. This, on separating, left a deep hole which gradually healed up. A depressed scar is now the only sign of the accident remaining.

It is, of course, apparent to you that the dose of antidote necessary in the case of any cobra bite must depend on two unknown quantities, *viz.* : (1) on the amount of venom injected by the snake, and (2) on the smallest quantity of venom which can

kill a man. It is also apparent that we must, however, always calculate on the assumptions that the snake has been a full-sized one and that it has injected the maximum quantity which can be squeezed out from the gland, and, further, that man is as susceptible, weight for weight, as the most susceptible animal with which we are experimentally acquainted. Granted these assumptions, there is no doubt that from 30 to 40 cubic centimetres would be necessary in some cases of snake-bite in order even to save the life of the patient. It is, of course, evident that in many cases, such as, when the snake has been a small one, when it has already exhausted its poison, when it has not got properly home with its bite, &c., a much smaller quantity would suffice. I should, however, recommend you to inject right off in all cases of Cobra bite three bottles of serum and to watch the result. If no symptoms appear, nothing further need be done. Should symptoms come on after this injection, another injection of the same amount should be given.

The above doses apply only in those cases in which marked nervous symptoms have not developed before the patient comes under treatment. Should paralysis have begun, then intravenous injection should be made of at least 30 cubic centimetres and, if necessary, repeated. The symptoms show us that the venom has already joined on to the nerve centres, and to affect it now, "mass" action must be resorted to. The poison must be separated from its connection with the nerve centres by means of an overwhelming amount of antitoxin.

If the antidote is used in this way and in these quantities, I am convinced that, if a patient is not absolutely moribund when he comes under treatment, every case of Cobra bite should be saved.

Now a word, in conclusion, as regards the local treatment of these cases. Nothing should be done, with the exception, perhaps, of applying a tight ligature above the bite. This delays the absorption of the poison and gives the serum time to be absorbed into the blood and to neutralise the poison circulating there. Cutting open the wound, sucking, cauterising with the actual cautery or with strong acids and such like heroic measures are of little avail. They may destroy a small quantity of the poison with which they come in contact, but in animal experiments it has been definitely shown that they do not or only slightly delay the march of the symptoms.

In the cases where recovery has resulted after the use of these measures alone, the explanation undoubtedly is, either that a fatal dose has not been injected or that the snake has been a non-poisonous one or, perhaps, a lizard.

The injection of chloride of lime, permanganate of potash or chloride of gold at the site of the bite has been, I know, recommended by Calmette. Martin, however, has shown that this also has no effect in delaying the symptoms if a ligature has not also been applied. When a ligature has been applied along with such an injection, it is the ligature and not the injection which has been beneficial.

As regards the treatment of Daboia intoxication I know of no specific. These cases have to be treated on general principles—stimulants of a diffusible nature to tide over the stage of cardiac depression might be given. Beyond this I can suggest nothing which would be at all likely to influence these cases for the better.

I have told you that the whole problem of the physiological action of the venoms of the Kraits and of the Echis has still to be worked out, and that antidotes have still to be got for the poisons of the Daboia, the Kraits and the Echis. Should any of you be in the position to procure living specimens of these snakes, especially Kraits, I earnestly beg of you to send them to me. There is no limit to the number I can receive, and I am willing to pay any expenses which may be incurred. If you help me in this, I promise you that I shall do my part of the work to the very best of my strength and ability.

ON NEW AND LITTLE-KNOWN BUTTERFLIES, MOSTLY FROM THE ORIENTAL REGION.

By Lionel de Nicéville, F.E.S., C.M.Z.S., &c.

(With Plate FF.)

(*Read before the Bombay Natural History Society on* 19*th Nov.*, 1901.)

Family NYMPHALIDÆ.

Subfamily Danainæ.

1. Euplœa (*Crastia*) kinbergi, Wallengren. Plate F.F., fig. 1 ♀.

E. kinbergi, Wallengren, Wien. Ent. Monatsch., vol. iv, p. 35, n. 8 (1860); idem, id., Kongl. Svensk. Fregat. Eugenies Resa, Zool. p. 352, n. 4 (1861) Insecta; *Crastia kinbergi*, Butler, Journ. Linn. Soc. Lond., Zoology, vol. xiv, p. 297, n. 6 (1878); *Tronga kinbergi*, Moore, Proc. Zool. Soc. Lond., 1883, p. 269, n. 12; *Euplœa lorquinii*, Felder, Reisi Novara, Lep., vol. ii, p. 340, n. 472 (1865); *Euplœa felderi*, Butler, Proc. Zool. Soc., Lond., 1866, p. 275, n. 20; idem, id., Journ. Linn. Soc. Lond., Zoology, vol. xiv, p. 300, n. 18 (1878); *Euplœa* (*Crastia*) *frauenfeldi*, Walker (*nec.* Felder), Trans. Ent. Soc. Lond., 1895, p. 447, n. 11; *Crastia frauenfeldii*, Moore (*nec* Felder), Lep. Ind., vol., i, p. 87, pl. xxvii, figs. 1, 1*a*, *male* (1890).

Habitat: Southern China (Hongkong Kowloon, Macao).

Through the kindness of Professor Chr. Aurivillius of Stockholm I have received the very beautiful coloured drawing of the type specimen of *E. kinbergi*, Wallengren, here reproduced. It was originally described from "China, December" an extremely vague locality, China being so vast a country. Professor Aurivillius writes to me, however, that the unique specimen, a female, which Wallengren described "was taken during the cruise of H. M. S. 'Eugenie,' and must, therefore, be from the neighbourhood of Hongkong, the only place in China, which, as far as I know, was visited by the 'Eugenie' frigate." Wallengren failed to give the sex of his type specimen which, however, is a female. Professor Aurivillius further writes: "*E. kinbergi* is probably the female of a common and well-known species," a very just remark, as *E. kinbergi* is the commonest *Euplœa* in Hongkong, flying all the year round. It is extremely variable, some are strongly glossed with blue on the upperside of the forewing, others, like the specimen Dr. F. Moore has figured in Lep. Ind., lack this gloss almost entirely; the maculation also is very inconstant, as it is in so large a number of species in the genus, but it would be tedious to recapitulate these numerous variations.

Its name occurs but rarely in the literature of butterflies. Dr. A. G. Butler records it correctly from China as a *Crastia*, Dr. F. Moore in 1883 gives it from China, but places it incorrectly in his genus *Tronga*, and Herr H. Fruhstorfer incorrectly records it from East Java. As regards its synonyms, Dr. Felder re-described it as *E. lorquinii* from Southern China, and Dr. A. G. Butler as *E. felderi* from Hongkong and Sumatra, the type specimen being apparently from Sumatra. The association of these two habitats is unfortunate, no species of *Euplœa* occurring both in China and Sumatra as far as I am aware. If the "type" of *E. felderi* is a Sumatran insect, the synonymy should read "*E. felderi*, part." Dr. Butler has noted that *E. felderi* "is the *E. lorquinii* of Felder". Mr. James J. Walker in his Preliminary List of the Butterflies of Hongkong records it as *Euplœa* (*Crastia*) *frauenfeldii*, var. *a lorquinii*, Felder, and says that the larva feeds on *Strophanthus divergens*. Lastly, Dr. Moore has described and figured it from "a single male, in the collection of the British Museum, which was taken at Trincomalee on the north-east side of the island." I am very incredulous that this specimen ever came from Ceylon*; moreover the true *E. frauenfeldii* is a Nicobareese species, and a synonym of it is the *E. esperi* of Felder, as Felder has himself admitted.

2. EUPLŒA (*Chirosa*) ERA, n. sp. Plate FF, fig. 2 ♂.

HABITAT: Santa Cruz, one of the Solomon Isles.

EXPANSE: ♂, 2·9 and 3·1 inches.

DESCRIPTION: MALE. Near to *Euplœa* [*Chirosa*] *netscheri* Snellen, Tijd. voor Ent., vol. xxxii, p. 384, pl. VIII, fig. 3, *male* (1889), from New Guinea (*Snellen*), in my collection from Humboldt Bay and Andai, in the north-west of that island, and from Stefansort, in German New Guinea, from which it differs on the UPPERSIDE of *both wings*, having the ground-colour darker, and the margins paler, much less rufous, and narrower. *Forewing* has the sexual brand straight instead of curved. *Hindwing* has the dark-ground colour very much more extensive, occupying two-thirds of the area instead of about one-third. UNDERSIDE *both wings* with the same differences as on the upperside; the markings the same as in *E. netscheri*, they consist of a small bluish-white spot in the discoidal cells, the *forewing* with two small spots beyond the cell divided by the third median nervure, and a

* *Vide* de Nicéville, Journ. A. S. B., vol. lxviii, pt. 2, p. 178 (1899.)

larger elongated one in the first median interspace; *hindwing* with five small spots arranged in a curved band beyond the cell, one in each interspace.

Described from two specimens kindly given to me by Mr. Henley Grose-Smith.

Subfamily SATYRINÆ.

3. CALLEREBIA NIRMALA, Moore. Plate FF, Fig. 3♂.

Erebia nirmala, Moore, Proc. Zool. Soc. Lond., 1865, p. 501, n. 91; *Callerebia nirmala*, id., Lep. Ind., vol. ii, p. 100, pl. xvi, figures 2, 2*a*, 2*b*, 2*c*, 2*d*, 2*e* (1893).

HABITAT: Drosh, Chitral, Western Himalayas.

EXPANSE: ♂, 2·0 inches.

DESCRIPTION: MALE. The specimen figured is an aberration or "sport" of the common *C. nirmala*, Moore, which is found all over the Western Himalayas. It was sent to me by Mr. W. H. Evans, R.E., without date of capture. It differs from typical specimens of true *C. nirmala* taken at Drosh in July and August by having no ocelli on the UPPERSIDE whatever; on the UNDERSIDE of the *forewing* the sub-apical ocellus is very small, less than half the normal size, and the *hindwing* has no ocelli. It is a far more aberrant form than the vars. *intermedia* and *cashapa* of Dr. Moore figured in Lep. Ind. It is apparently scarce, as the specimen figured is the only one Mr. Evans has obtained, whereas typical *C. nirmala* is very common in Chitral.

Subfamily ELYMNIINÆ.

4. ELYMNIAS (*Dyctis*) MELA, n. sp. Plate FF, figs. 4♂, 5♀.

HABITAT: Ké Islands.

EXPANSE: ♂, 3·1 to 3·4; ♀, 3·4 to 3·6 inches.

DESCRIPTION: MALE. UPPERSIDE, *both wings* deep indigo-blue more or less shaded with green. *Forewing* with a sub-apical curved macular fascia commencing just behind the costa and ending on the anal angle, the fascia is widest anteriorly decreasing posteriorly, anteriorly it is whitish mixed with green, posteriorly entirely green, in one specimen the submarginal oval black spots on the underside appear also on the upperside on the above-described fascia. *Hindwing* with a large outer discal patch, white shaded with green at the edges, outwardly bearing two, three or four round black spots. UNDERSIDE *both wings* fuscous, in old specimens this blackish colour fades to a dull ferruginous. *Forewing* with the sub-apical fascia as on the upper-

side, but narrower and entirely white, at its outer edge or just beyond its edge there are sometimes as many as four oval black white-pupilled spots, which may be reduced to three, two, one or none. *Hindwing* with the outer discal patch of the upperside much narrower and entirely white, bearing as many as five round black white-pupilled ocelli, the posteriormost ocellus the largest and bi-pupilled, the ocelli decreasing in size towards the apex of the wing, the anteriormost ocellus sometimes wanting, the two anteriormost ocelli, often blind, the three posteriormost ocelli broadly surrounded with orange. *Cilia* throughout white, but marked with black at the ends of the veins. *Antennæ, thorax and abdomen* black. FEMALE. UPPERSIDE, *both wings* of a curious shade of dull fuscous, outwardly darker, almost black. *Forewing* with a large discal white patch divided by the fuscous veins, inwardly powdered with dull fuscous scales, posteriorly tinged with bluish, the fascia is broadest anteriorly, rapidly decreasing in width posteriorly. *Hindwing* also with a large discal white patch, beyond which are four round black spots, the two anteriormost blind, the other two sometimes with a bluish pupil, the anteriormost spot, the smallest, the penultimate spot the largest, the two anteriormost spots placed on a bluish ground. UNDERSIDE, *both wings* dull fuscous. *Forewing* with the discal white patch as on the upperside but posteriorly it is broader, at its outer edge are four round black spots, the two anteriormost pupilled with pale-blue, the others blind, the one in the upper discoidal interspace the largest, faintly appearing on the upperside. *Hindwing* with a large discal white patch, anteriorly sharply bounded by the second subcostal nervule, posteriorly ending in the middle of the submedian interspace; with five ocelli at the outer edge of the patch as in the male, but the ocelli are all larger and all pupilled. *Cilia* as in the male. *Antennæ* and *thorax* fuscous. *Abdomen* chrome-yellow.

Mr. Hewitson in Proc. Zool. Soc. Lond., 1858, p. 465 and plate LV, described a male and three females (which latter he called varieties of an *Elymnias* which he named *Melanitis melane*, giving the habitat as New Guinea. He remarked:—" Greatly as the four examples of the plate differ from each other, I cannot separate them, except in colour; their chief variation seems to consist in the differing distance of the eye-like spots from the outer margin. This may be noticed in the genus *Drusilla* [*Tenaris*], in which the beautiful large eyes of the

posterior wing vary much in their relative distance from the outer margin." With regard to this last remark I may note that the two species (one each) of *Elymnias* which are found in the Ké and Aru Archipelagos respectively appear from the considerable series of both in my collection to be quite constant as regards the position of the ocelli on the hindwing.

Dr. A. R. Wallace in Trans. Ent. Soc. Lond, 1869, p. 329 n. 29, in speaking of *Elymnias melane*, Hewitson, records that species from the Aru and Ké Islands only, and not from New Guinea, the habitat given by Mr. Hewitson. He noted :—" *Males.* Mr. Hewitson's fig. 1. represents a male from the Aru Islands; one from the Ké Islands [my *E. mela*] has the whitish band on the hindwings much broader, and the black spots without ocelli. *Females.* Mr. Hewitson's fig. 2. represents one from [the] Ké Islands [this figure does not agree with my *M. mela*, as the figure has no white patch on the hindwing, the form figured probably occurring in the Aru Islands]; another from Aru is much darker, and has the white patch on the anterior wings reduced. Fig. 3 is from the Aru Islands. [I have seen no female from the Aru Islands agreeing with this figure, which shows an almost entirely white insect on the upperside. Is Dr. Wallace correct in saying this very distinct form is found on the Aru Islands ?] Fig. 4 [also fig. 5] is from the Ké Islands. [This figure does not agree with my Ké Islands females ; the ground-colour of the forewing on the upperside is ferruginous instead of dull fuscous, and the white areas on both wings on both surfaces as shown in the figures are much more extensive ; it probably is found in New Guinea only.] It is difficult to determine whether the forms from these two islands should be separated. There are some differences in neuration, but a close examination of all my specimens has shown that these are not constant in both sexes. It will, perhaps, be better therefore to leave them together till a more extensive series from both islands may enable us to determine if any constant differences exist."

I may note, in conclusion, that all writers (Ribbe, Standinger, Külin and myself) have hitherto followed Dr. Wallace in recording *E. melane* from the Ké Islands, but as the *Elymnias* from thence agrees with none of Hewitson's figures of *E. melane*, and is, moreover, within certain slight limitations constant, it appears to me that it is a distinct species, and I have here figured both sexes.

Since the above was written, Mr. H. Fruhstorfer in Stet. Ent. Zeit., vol. lx, pp. 339-342 (1899) has given a revision of the species of *Elymnias* of the *agondas* group. He gives "*E. agondas melane*, Hewitson and Wallace" from the Key Islands (p. 342), although Hewitson described it from New Guinea, and none of Hewitson's figures agree with any examples I have seen from the Ké Archipelago. He describes *E. agondas aruana*, new subspecies, pp. 341, 342, from the Aru Islands. The female can at once be distinguished from that sex of *E. mela* from the Ké Isles both by having the abdomen yellow instead of black; both sexes of species differ greatly in coloration and markings.

5. ELYMNIAS (*Dyctis*) MELANE, Hewitson.

Melanitis melane, Hewitson (part), Proc. Zool. Soc. Lond., 1858, p. 465, pl. lv, figs. 1, *male*; 2, *female*.

HABITAT. Aru Islands?; New Guinea (*Hewitson*). Mr. Hewitson's figure of the male of this species is quite good and agrees with my specimens from the Aru Islands; the figure of the female, however, is not correct, as it shows the ground-colour of the upperside ferruginous, whereas in my Aru Island specimens it is greenish-plumbeous. Hewitson calls it "light rufous-brown." Whether or no, true *E. melane* as here restricted really occurs in New Guinea or not I am unable to say, as I have no specimen from New Guinea which agrees with Hewitson's figures. Dr. A. R. Wallace does not quote Hewitson's habitat for it, but says that *E. melane* is found in the Aru and Ké Islands only. The female figure quoted, he says, represents a Ké Island specimen, but it does not agree with my females from the Ké Islands. Mr. H. Fruhstorfer has named the Aru Islands form *E. agondas aruana*.

6. ELYMNIAS (*Dyctis*) MELETUS, n. n.

Melanitis melane, Hewitson (part), Proc. Zool. Soc. Lond., 1858, p. 465, pl. lv, fig. 3, *female*.

HABITAT: New Guinea (*Hewitson*).

I propose to re-name Mr. Hewitson's figure quoted above. He thus describes it: "Differs from the last [figure 2, typical *E. melane*, Hewitson, female] (which appears to be the most typical) as represented in the plate. On the under side it differs from that figure in having the costal margin broadly brown, the eye-like black spots surrounded with orange, the spot nearest the anal angle marked with two dots of light blue."

As the females of *Elymnias* are never *dimorphic* as far as I am aware, I think it more than probable that this form represents a distinct species. Dr. Wallace says that it is found in the Aru Islands, but it differs widely from my females from thence.

7. ELYMNIAS (*Dyctis*) MELITIA, n. n.

Melanitis melane, Hewitson (part), Proc. Zool. Soc. Lond., 1858, p. 465, pl. iv figs. 4, 5, *female*.

HABITAT: New Guinea (*Hewitson*).

I also propose to rename Mr. Hewitson's figures above quoted. He describes this form thus:—"Has (more than the other varieties) two indistinct black spots on the upper side of the anterior wing. On the under side there are three such spots (two only, dotted with light-blue). On the under side of the posterior wing there is a fifth black spot." Dr. A. R. Wallace says that this form is found in the Ké Islands, which, however, is not my experience. Like *E. meletus*, mihi, it probably occurs in New Guinea as Mr. Hewitson says it does.

ATELLA ARIEL, n. sp.

HABITAT: Humboldt Bay, N.-W. New Guinea.

EXPANSE: ♂, 2·0 inches.

DESCRIPTION: MALE. Nearest to *A. fraterna*, Moore, from the Nicobar Isles. UPPERSIDE, *forewing* differs from that species in having no black markings on the disc and base below the median nervure, the black band on the outer margin broader. *Hindwing* differs in the discal and basal black markings in *A. fraterna* being absent in this species, the outer black border darker. UNDERSIDE *both wings* of a darker shade of fulvous, all the black markings more conspicuous, the discal macular fascia tinged with lilac instead of being pale fulvous. It is also near to *A. arruana*, Felder, from the Aru Isles, but is of a different shape, the wings being shorter, the ground-colour of the upperside paler, the black markings more numerous.

Mr. Henley Grose Smith in Nov. Zool., vol. i, p. 348, n. 87 (1894) has recorded *A. arruana* from Humboldt Bay, Dutch New Guinea, collected by the late Mr. W. Doherty, from whom I received *A. ariel*, and it is probable that Mr. Grose Smith's specimens are really the latter species. Herr Th. Kirsch in Mitth. Zool. Mus. Dresden, vol. ii, p. 124, n. 81 (1877), also records *A. alcippe* var. *arruana* from north-western New Guinea. From Tule Island, New Guinea, *A. cervina*, Butler, has also been described, but it is apparently quite distinct from *A. ariel*.

The following species of the *alcippe* group of the genus *Atella* have been described. I have arranged the species chronologically.

(1.) *Papilio alcippe*, Cramer, Pap. Ex., vol. iv., p. 207, pl. ccclxxxix, figs. G., H., *female* (1782).

HABITAT: Amboina (*Cramer*); Ceram; Batchian; Gilolo (*Wallace*); Ambonia; Batjan; Halmaheira (*Pagenstecher*); Great Ceram (*Ribbe*); Kaisir Wilhelmsland, German New Guinea (*Hagen*); Moluccas; Halmaheira (*Fruhstorfer*); Amboina; Ké Isles; Moluccas (*Moore*); Bhatjan; Halmaheira (*coll. de Nicéville*).

(2.) *Atella arruana*, Felder, Wien. Ent. Monatsch., vol. iv, p. 236, n. 84 (1860).

HABITAT: Arru Isles (*Felder*); Aru Isles; Mysol (*Wallace*); Aru Isles (*Ribbe*); New Guinea (*Kirsch*); Aru Isles (*Fruhstorfer*) Aru Isles (*coll. de Nicéville.*)

(3.) *Atella celebensis*, Wallace, Trans. Ent. Soc., Lond., 1869, pp. 343, 344.

HABITAT: Macassar in Celebes (Wallace); Celebes (*Hopffer*); S. W. Celebes (*Snellen*); North and South Celebes (*Fruhstorfer*).

I have not seen this species.

(4.) *Atella cervina*, Butler, Proc. Zool. Soc. Lond., 1876, p. 767, pl. lxxvii, fig. 5, *female*.

HABITAT: Yule Island off New Guinea (*Butler*); Hattam, Kapaur, Dorey—all in New Guinea (*Fruhstorfer*).

I have not seen this species, which is apparently nearest to *A. arruana*, Felder.

(5.) *Atella alcippe*, var. *pallidior*, Staudinger, Iris, vol. ii, p. 48 (1889).

HABITAT: Palawan Isle in the Philippines; Sikhim; Andaman, Isles; Malacca; Borneo; Philippine Isles (*Staudinger*).

Under this name I would place the *A. alcippe* of Semper, Schmett Philipp., p. 127, n. 149, pl. xx, figs. 8, *male*; 9, *female* (1888), p. 344, n. 149, (1892), from North-East Luzon, Central Luzon, Cebú, Camiguin de Mindanao, East Mindanao, Mindoro—all in the Philippine Isles; Sulu Isles (*Semper*); the *A. alcippe* of Distant, Rhop, Malay., p. 174, n. 2, (with a woodcut of a male (1882), from Sylhet; the Andaman Isles; Burma; Tavoy; Penang and Province Wellesley (*Distant*) the *A. alcippe* of de Nicéville, Butt. of Ind., Burmah and Ceylon, vol. ii, p. 31, n. 315 (1886), from Sikhim; Sylhet; Mergui,

Tavoy; Malay Peninsula; Andaman Isles (*de Nicéville*); the *A. alcippoides* and *A. semperi* of Moore, and the *A. alcippe violetta* of Fruhstorfer, mentioned below. Fruhstorfer records *A. pallidor* [sic!] from Malacca, Sumatra, Java, Palawan in the Philippines, and Flores. It occurs in the hills of North-Eastern India, Assam, Burma, the Malay Peninsula, in Kanara in South India, the Andaman Isles, Sumatra, Java, Borneo, the Philippine Isles (I have it only from Bazalan Isle), and probably from Engano Isle from whence Mr. Doherty has recorded *A. alcippe*. In South India (Kanara) the larva of this butterfly feeds on *Alsodeia zeylanica*, Thwaites, Natural Order *Violaceæ*, not on *Hydrocarpus*, sp., as recorded by Messrs. Davidson, Bell and Aitken.

(6.) *Atella alcippoides*, Moore, Lep. Ind., vol. iv, p. 199, pl. ccclxi, figs. 1, 1*a*, *male*; 1*b*, *female*, *wet-season* form; 1*c*, 1*d*, *male*, *dry-season form* (1900).

HABITAT: Sikhim; Silhet; Khasias; S. India; Burma; Tenasserim; Andamans; Malay Peninsula; Borneo (*Moore*).

This species is a synonym of *A pallidior*, Staudinger, which Dr. Moore restricts to Palawan in the Philippines.

(7.) *Atella fraterna*, Moore, Lep. Ind., vol. iv, p. 201, pl. ccclxi, figs. 2, *male*; 2*a*, 2*b*, *female* (1900).

HABITAT: Little Nicobar, Nankauri, Teressa, Kutschall—all in the Nicobar Isles (*Moore*).

This species may perhaps be retained, though it is very close to Andamanese specimens of *A. pallidior*, Staudinger.

(8.) *Atella semperi*, Moore, Lep. Ind., vol. iv, p. 201 (1900).

HABITAT: Luzon in the Philippine Isles (*Moore*).

Dr. F. Moore has re-named Herr Georg Semper's *A. alcippe*, Schmett, Philipp., p. 127, n. 149, pl. xx, figs. 8, *male*; 9, *female* (1888), p. 344, n. 149 (1892), recorded by him from North-East Luzon, Central Luzon, Cebú, Camiguin de Mindanao, East Mindanao and Mindoro, all in the Philippines. I can discover no character by which to separate this species from *A. pallidior*, Staudinger.

9. *Atella alcippe violetta*, Fruhstorfer, Berl. Ent. Zeitsch., vol. xlv, p. 17, n. 41 (1900).

HABITAT: Bazilan in the Philippines; Jolo Isle; Andamans; Nicobars (*Fruhstorfer*).

This species was described in the same year (1900) as *A. alcippoides* and *A. semperi* by Dr. Moore. As all three species are synonymous with the much older *A. pallidior*, Staudinger, it is unimportant whose species, Moore's or Fruhstorfer's, is the older. The Nicobar race given by Fruhstorfer as *A. violetta* is the *A. fraterna* of Moore.

Subfamily NYMPHALINÆ.

8. ARGYNNIS VITATHA, Moore. Plate FF, Fig. 6 ♀.

A vitatha, Moore, Proc. Zool. Soc. Lond., 1874, p. 568.

HABITAT : Ziarat, Chitral, Western Himalayas.

EXPANSE : ♀, 2·8 inches.

DESCRIPTION : FEMALE. The specimen here figured was sent to me by Mr. W. H. Evans, R.E., and is quite unique. I have seen nothing at all like it. If it is true *A. vitatha* it bears the same relation to that species that the dimorphic second form of the female (*valezina*, *Esper*) does to the normal first form of the female of *A. paphia*, Linnæus. It is much larger than normal females of *A. vitatha*, the UPPERSIDE of *both wings* are of a rich deep glossy purple colour instead of being fulvous, the *hindwing* with a rounded spot at the end of the discoidal cell, a streak beyond it, behind the latter a small round spot in the upper median, another four times the size in the lower median, and a third similar in size to the second in the submedian interspace, and the submarginal series of seven lunules all whitish instead of fulvous. On the UNDERSIDE of the *forewing* all the black markings are larger and of a deeper shade than in *A. vitatha*, and the green ground-colour of the *hindwing* is much deeper and richer.

Normally coloured *A. vitatha* occurs in Gilgit, which is close to Chitral ; the single female here described, which was caught in August, is the only specimen of that species I have hitherto received from Chitral. It probably bears the same relation to normal *A. vitatha* that the dark females of *A. aglaia*, Linnæus, found in England, do to the ordinary light females, as mentioned by Mr. H. J. Elwes, (Trans. Ent. Soc. Lond., 1889, p. 559), *A. vitatha* being a local race of *A. aglaia*.

Family LYCÆNIDÆ.

9. CYANIRIS SHELFORDII, n. sp. Plate FF, Fig. 7 ♂.

HABITAT : Matang, 3,200 feet, Sarawak, Borneo.

EXPANSE : 2·2 inches.

DESCRIPTION: MALE. UPPERSIDE, *both wings* shining, rather dark-blue. *Forewing* with the costa as far as the subcostal nervure, the apex broadly, and the outer margin less broadly and slightly decreasingly towards the anal angle black; a conspicuous narrow black line on the disco-cellular nervules. *Hindwing* with the costa broadly blackish; the outer margin rather broadly black, with a series of six bluish lunules anterior to this black border, again inwardly bounded by a narrow blackish lunulated band. UNDERSIDE, *both wings* dead white, the markings black (not fuscous), rather small and very conspicuous; with the usual narrow black line defining the outer end of the cell; an anteciliary black thread. *Forewing* with an outer discal curved series of six small linear spots, placed transverse to the veins and not in echelon; a similar sub-marginal and marginal series, the latter inconspicuous. *Hindwing* with the usual basal and discal spots, rather small and uniform in size; a submarginal lunulated line; and a marginal series of six oval spots placed between the veins.

Of the known Bornean species of *Cyaniris* this is nearest to *C. plauta*, H. H. Druce, which, however, I have not seen. From the description and figure of that species it differs in being smaller, on the upperside of the hindwing in having no white areas; *C. plauta* has a marginal series of black spots which in *C. shelfordii* are developed into a continuous band. On the underside the coloration and markings appear to be very similar in the two species.

Mr. H. H. Druce in Proc. Zool. Soc., Lond., 1895, pp. 571-575, and 1896, p. 655, records ten species of *Cyaniris* from Borneo, namely—(1) *C. dilectissima*, H. H. Druce, (2) *C. puspa*, Horsfield, (3) *C. placidula*, H. H. Druce, (4) *C. lugra*, H. H. Druce, which undoubtedly is the same species as *C. musina*, Snellen, from Perak in the Malayan Peninsula, Sumatra and Lombok, (5) *C. salma*, H. H. Druce, (6) *C. strophis*, H. H. Druce, (7) *C. plauta*, H. H. Druce, (8) *C. ripte*, H. H. Druce, (9) *C. camenæ*, de Nicéville, and (10) *C. sonchus*, H. H. Druce. Of these I possess specimens from the State of Sarawak of Nos. 2, 3 and 4. I have besides (11) *C. shelfordii*, de Nicéville, and (12) *C. melæna*, Doherty. Ten species are known to me from Sumatra, and nine from Java, so Borneo is the richest of the three islands in this genus. Dr. A. G. Butler in his "List of the Species of *Cyaniris*, a well-known Group of the Family *Lycæinidæ*" in Ann. and Mag. of Nat. His. seventh series, Vol. V, pp. 441-451

(1900), gives only three species of *Cyaniris*, from Sumatra, *cossœa*, *corna* and *corythus*, all described by myself, and five from Java *akasa*, Horsfield, *puspa*, Horsfield, *coalita*, de Nicéville, and *catreus* de Nicéville. He records *C. ceyx* with a query from Java; I possess seven males from thence, and three males and a female from Celebes. He says he has specimens of *C. ceyx* from Foo Chow in China; these probably represent a distinct species, as excepting *C. akasa*, Horsfield, and *C. puspa*, Horsfield, the oriental species of the genus are not widely distributed. As regards *C. cara*, de Nicéville, he notes "Mr de Nicéville knows his genera of *Lycœnidæ*; otherwise, I should certainly have supposed this to be a *Lycœnesthes* near to *L. turneri*, Miskin". But the last named species has the apex of the forewing in the males typically produced, while *C. cara* has it rounded as is typical of the genus *Cyaniris*, and the latter has no sign of the ciliated "tales" to the hindwing usually found in *Lycœnesthes*. I think therefore that *C. cara* is a true *Cyaniris*.

10. NACADUBA NI, n. sp. Plate F F, Fig. 8 ♂.

HABITAT: N.-E. Sumatra; W. Java.

EXPANSE: ♂, 1·1 to 1·2 inches.

DESCRIPTION: MALE. Nearest allied to *N. bhutea*, de Nicéville, from Sikhim, but is tailless, whereas that species is tailed. UPPERSIDE, *both wings* similar to those of that species. UNDERSIDE, *both wings* with the ground-colour more ochreous. *Forewing* with the spots forming the discal catenulated band separated further from one another, the band more regular, the spot in the first median interspace nearer the margin of the wing, and with an additional spot behind it in the submedian interspace; and, most important of all, the base of the wing up to and including the spot in the middle of the discoidal cell heavily clouded with fuscous; otherwise similar. *Hindwing* as in *N. bhutea*.

This species differs markedly from the same sex of the tailless, form of *N. noreia*, Felder, in its larger size, more pointed apex and straighter outer margin of the forewing, and on the underside of the forewing in the discal band forming a regular curve instead of being dislocated behind the second median nervule. The black clouded base of the wing will distinguish it from all the species of *Nacaduba* known to me. Mynheer P. C. T. Snellen has kindly sent me coloured drawings of his *Lycœna datarica* and

L. glauca, described from Java in Tijd. voor Ent., Vol. XXXV, pp. 140, n. 5, and 142, n. 6 (1892), taken from the types, which are reproduced on Pl. FF, figures 8 and 9, respectively. Both represent the male sex, and are tailless species of the genus *Nacaduba*. They are certainly distinct from *N. ni*, but are very near to *N. noreia*, Felder, the tailed form of which has been described as a distinct species by Dr. F. Moore as *N. ardates*, to *N. hampsonii*, de Nicéville, and to *N. dana*, de Nicéville, the latter probably being the same species as *Plebeius tombugensis*, Röber, Iris, Vol. I, p. 63, pl. V, fig. 18, *male* (1888), from Tomboegoe in East Celebes, and *Lycæna ardeola*, Staudinger, Iris, Vol. II, p. 97 (1889) from Darjeeling, Calcutta [this latter locality is certainly incorrect], and Palawan, one of the islands in the Philippine Archipelago. The drawing of "*Lycæna*" *glauca* agrees almost exactly, except in being taken from a larger specimen, with specimens of *N. noreia* from Java in my collection. Another allied species is *N. nelides*, de Nicéville, Journal, Bombay Nat. Hist. Soc., Vol. IX, p. 280, n. 16, pl. O, fig. 24, *male* (1895), from N.-E. Sumatra. The typical form from Sumatra is tailed, but on page 281, I described a tailless variety from West Java of the same species. This also is very close to the drawing of *N. glauca*. Till the types or typical specimens of these various species are brought together and carefully compared, it will, I fear, be very difficult to say definitely how many of them, or if all, are really distinct species or not.

Described from many males from N.-E. Sumatra, and a single male from Sukabuni, 2,000 feet, W. Java, collected by Mr. H. Fruhstorfer in 1893.

11. CURETIS PARACUTA, n. sp.

C. acuta, Pryer (nec. Moore), Rhop. Nihonica, p. 11, n. 26 (1886), pl. iv, figs. 1A, *male*; 1B, *female* (1888); id., Leech, Butt. from China, Japan, and Corea, p. 349 (1893).

HABITAT: Japan.

EXPANSE: ♂, 2·0 to 2·1; ♀ 2·0 to 2·2 inches.

DESCRIPTION: MALE. UPPERSIDE, *both wings* may be distinguished from all known species of the genus by having the red areas of a duller colour, ferruginous rather than cupreous; as usual, the extent of the red colouration varies greatly, in some specimens being twice as great as in others. FEMALE. UPPERSIDE, *both wings* differen-

tiated in the same way by the white areas being heavily frosted with bluish scales, the extent of these bluish-white areas being as variable as in the male ; and the apex of the *forewing* also varies in its greater or lesser acumination.

All writers on Japanese butterflies have called the species of the genus *Curetis* occurring there *C. acuta*, Moore, which was originally described from Shanghai in North China, and of which the *C. truncata* of Moore, and the *C. angulata* of Moore are, in my opinion, synonymous. *C. acuta* occurs from the eastern coast of China (Shanghai and Hongkong) to the Western Himalayas. The female has the wings above with white central areas. The late Mr. H. Pryer's figure of the female of the Japanese *Curetis* is very bad, as it shows the upperside of both wings white instead of bluish-white as it is, I believe, invariably. He describes it as "blue." *C. paracuta* appears to be a fairly common species in Japan, Pryer giving four localities for it, Leech the mountains of Central Japan, and I have it from Tokio and Nikko, besides other places not specified.

12. CHRYSOPHANUS EVANSII, n. sp. Plate FF, Fig. 11 ♂.

HABITAT : Drosh, Chitral, Western Himalayas.

EXPANSE : ♂, 1·3 inches.

DESCRIPTION : MALE. Closely allied to *C. sarthus*, Staudinger*, from the Pamirs, from which it appears to differ in being larger and the forewing narrower and more elongated. UPPERSIDE, *hindwing* has the anal orange patch much smaller, reduced to a small and narrow streak on the submedian nervure. UNDERSIDE, *forewing* has the orange area larger, occupying nearly the entire surface, the black spots fewer in number, the spot behind and opposite the one in the middle of the discoidal cell in *C. sarthus* absent, and the discal series entirely absent ; the spots of the submarginal series are smaller. *Hindwing* the same as in *C. sarthus*.

Described from a single specimen kindly given to me by Mr. W. H. Evans, R.E., who captured it.

Family PAPILIONIDÆ.

Subfamily PIERINÆ.

13. COLIAS EOGENE, Felder. Plate FF, Fig. 12 ♀.

C. eogene, Felder, Reise Novara, Lep., vol. ii, p. 196, n. 197, pl, xxvii, fig. 7, *male* (1865); id. Erschoff in Fedtschenko's, "Travels in Turkestan," series ii, Zoology, vol. v, pt. 3, p. 6, n. 15 (1874); id., Lang, Butt. Europe, p. 366 (1884); id., Elwes, Trans. Ent. Soc. Lond., 1880, p. 136; idem, id., Trans.

* *Polyommatus sarthus*, Staudinger, Stet. Ent. Zeit, vol. xlvii, p. 202 (1886); id., Groum Grshimailo, Mém. Lép., vol. iv, pp. 53, 95, 361, n. 56, pl. vi, fig. 5 *male* (1890).

Ent. Soc. Lond., 1884. pp 6, 8, 13, 14, 15; idem, id., Journ. Bomb. Nat. Hist. Soc., vol. xi, pp. 465, 466 (1898); id., Alphéraky, Stet. Ent. Zeit., vol. xliv, p. 493 (1883); id., Groum-Grshimaïlo, Mém. Lép., vol. iv, pp. 59, 246, 248, 266, 269-276, 278—282, 288, 298, n. 23, 329, n. 39, pl. v, figs. 1*a*, *male*; 1*b*, 1*c*, *female* (1890); *C. myrmidone*, var. *a*, *eogene*, Keferstein, Verh. Zool—bot. Gesells. Wien., vol. xxxii, p. 452, n. 2 (1883).

C. eogene, var.? *stolicskanus* [sic], Elwes, Trans. Ent. Soc. Lond., 1884; p. 6; *C. eogene*, var. *stolicskana*(?) Alphèraky, Mém. Lép., vol. iii, p. 404 (1887); *C. eogene*, var. *stolicskana*, id., Mém. Lép., vol. v, p. 74, n. 10, pl. iv, figs. 4*a*, 4*b*, *male*; 4*c*, 4*d*, *female* (1889); id., Groum-Grshimaïlo, Mém. Lép., vol. iv, p. 298, (1890); *C. eogene*, var. *stolicskanus*, Groum-Grshimaïlo, Mém. Lép., vol. iv, p. 266 (1890).

C. eogene var. *arida*, Alphéraky, Mém. Lép. vol., p. 76, n. 11 (1889); id., Groum-Grshimaïlo, Mém. Lép., vol. iv, p. 266 (1890); idem, id., Hor. Soc. Ent. Ross., vol. xxvii, p. 382, n. 12 (1893); *C. eogene*, var.? *arida*, Groum-Grshimaïlo, Mém. Lép., vol. iv, p. 298, n. 23 (e) (1890).

C. eogene arida, ab. *auritheme*, Groum-Grshimaïlo, Hor. Soc. Ent. Ross., vol. xxvii, p. 383, n. 13 (1893).

C. eogene arida, var. et ab.? *wanda*, Groum-Grshimaïlo, Hor. Soc. Ent. Ross, vol. xxvii, p. 383, n. 14 (1893).

C. eogene, ab. *cana*, Groum-Grshimaïlo, Mém. Lép., vol. iv, pp. 298, n. 23 (a), 333 (1890).

C. eogene, a var. *erythas*, Groum-Grshimaïlo, Mém. Lép., vol. iv, pp. 298, n. 23 (b), 332 (1890).

C. eogene, var. *elissa*, Groum-Grshimaïlo Mém. Lép., vol. iv, pp. 298, n. 23, (c) 332 (1890).

C. eogene, ab. *hybrida*, Groum-Grshimaïlo, Hor. Soc. Ent. Ross., vol. xxvii, p. 381, n. 10 (1892).

C. eogene, var. *leechi*, Groum-Grshimaïlo, Hor. Soc. Ent. Ross., vol. xxvii, p. 382, n. 11 (1892).

HABITAT: Female Form II, Skoro-la, Baltistan, Western Himalayas, 15,000 feet.

EXPANSE: ♀ Form II, 2·3 inches.

As will be seen from the synonymy given above, *C. eogene*, Felder, has received many names. I do not propose to add to them. *C. stoliczkana*, Moore, is now considered to be a distinct species, though three writers have placed it as a variety of *C. eogene*. The names *arida*, *auritheme*, *wanda*, *cana*, *erythas*, *elissa*, *hybrida* and *leechi* all represent varieties or aberrations of the parent form. As far as I can ascertain *C. eogene* throughout its extensive range in the Himalayas and to the north of them in the Central Asian plateau which includes the Pamirs, has never been recorded to be dimorphic in the female but on the Skoro-la [la=pass] in Baltistan, it certainly is so. This second form differs from the first form in having no orange coloration whatever on the upperside, that colour being replaced by bluish-white. On the

underside of the forewing the usual orange coloration is replaced by bluish-white. On the Skoro-la the late Mr. H. J. Leech and I in 1887 found *C. eogene* fairly common (though this species, as far as my Himalayan experiences go, is never really common), a fair proportion of the usual [Form I] females being obtained. But Form II was very rare, we got one on July 31st, one each day on August 3rd and 4th and two on August 5th, five in all, and we caught all we saw. No other *Coltas* occurred on the pass while we were on it, and there is no doubt that the bluish-white females of the *Colias* we took there in company with many males and ordinary females of *C. eogene* are actually a dimorphic female form of that species.

Family HESPERIIDÆ.

Genus Barca, n. n.

Mr. T. D. A. Cockerell in "The Entomologist", vol. xxxi, p. 45 (1898), having pointed out that the name *Dejeania*, Oberthür, Et. d'Ent., vol xx, p. 40 (1896), of which *Dejeania bicolor*, Oberthür, l. c., pl. ix, fig. 163, *male*, is the type, is preoccupied in *Diptera*, I propose the name *Barca* for this handsome hesperid, found in Tse-kou, Ta-tsien-lou, Mou-pin, and Sias-lou—all in Western China, of which Mr. Oberthür has kindly sent me seven male examples. The female appears to be unknown. The genus has been described by Messrs. Elwes and Edwards in Trans. Zool. Soc. Lond., vol. xiv, p. 169 (1897), under the name *Dejeania*.

EXPLANATION OF PLATE FF.

Fig. 1.	*Euplœa* (*Crastia*) *kimbergi*, Wallengen	...	♀, p.
2.	„ (*Chirosa*) *era*, n. sp.	... ...	♂, p.
3.	*Callerebia nirmala*, Moore ...	... ...	♂, p.
4.	*Elymnias* (*Dyctis*) *mela*, n. sp.	... ...	♂, p.
5.	„ „	... ...	♀, p.
6.	*Argynnis vitatha*, Moore ...	... ...	♀, p.
7.	*Cyanirts shelfordii*, n. sp. ...	... ...	♂, p.
8.	*Nacaduba ni*, n. sp.... ...	... ...	♂, p.
9.	*Lycœna datarica*, Snellen ...	... ...	♂, p.
10.	„ *glauca*, Snellen ...	... ...	♂, p,
11.	*Chrysophanus evansii*, n. sp.	... ...	♂, p.
12.	*Colias eogene*, Felder ...	... ...	♀, p.

(*To be continued.*)

THE FERNS OF NORTH-WESTERN INDIA.

Including AFGHANISTON, the TRANS-INDUS PROTECTED STATES, and KASHMIR: arranged and named on the basis of Hooker and Baker's *Synopsis Filicum*, and other works, with New Species added.

BY C. W. HOPE.

(*Continued from page* 127 *of this Volume.*)

PART III.—THE GENERAL LIST.—(*continued.*)

28. **Asplenium schimperi**, A. Br.; Syn. Fil. p. 489; Blanford in Journ. Asiat. Soc., Bengal, Vol. LVII, Part II, No. iv, 1888. *A. filix-femina*, Bernh., var. 8 (of C. B. Clarke's vars.), *Schimperi* (sp.), Mong.; Fèe, Gen. Filic. (Polypod), p. 187, Clarke et Baker, in Journ. L. Soc., 8-12-1888. *Athyrium schimperi*, A. Br., Bedd. Suppt. H. B., 36.

PUNJAB: *Hazára*—Thandiána 8500′, Trotter.

KASHMIR: Basaoli 6000′, Clarke No. 31595, 26-9-'76; Rattan Pir 8000′, Trotter.

PUNJAB: *Chamba*—Kajiár 7000′, Clarke No. 24038, 1874; 7-8500′, McDonell; 5-9000′ J. Marten, 1897; *Simla Reg.*—T. T. Bates; Simla and along the ridge eastward 8-10,500′, common.

N.-W. P.: *D. D. Dist.*—Jausár—Duthie's Collector; Mussooree and Landour 5-7000′ and upwards, very abundant; *T. Garh.* 8-9000′, Duthie, *Kumaun*—6-11,000′, common.

DISTRIB.—*Asia*: N. Ind. (Him.) Sikkim—Yakla, *T. T.*; Dárjiling 7200′, Levinge, *Gamble*. Centr. Ind.—Rájputána—Mt. Abu, *Duthie* No. 6794, 1887.

The Messrs. Mackinnon were, I believe, the first to hint that this fern was found in India, for in 1879, on getting the second edition of the "*Synopsis Filicum*", they thought that, from its widely creeping rhizome, the fern so common in Mussooree must be *A. schimperi* which was therein described, and they named their specimens accordingly. In Mussooree this fern grows in large beds. Some years later I mentioned the Mackinnons' opinion to Mr. Levinge, and I believe he and Mr. Blanford agreed it was correct, and worked it out when they retired from Government service and went home. Hence, probably, the entry of Simla as a habitat, on Blanford's authority, in Clarke and Baker's paper in Journ. L. Soc., 8-12-'88, though why Mr. Baker should have given in and withdrawn the species he admitted in the second edition, "*Synopsis Filicum*," I know not. These authors say, under *A. filix-femina*:—

> "Adde var. 8. Schimperi, sp. Mong., Fée, Gen. Filic. (Polypod.), p. 187; rhizomate horizontali elongato.
>
> "Simla, H. Blanford.
>
> "Exempla, a H. Blanford communicata, cum Abyssinicis omnino congruunt; H. Blanford autem exempla misit alia quorum rhizoma abbreviatum stipitibus contiguis."

From the last clause of the above, and also from what Blanford says in his "List" as to the fronds varying from lanceolate to deltoid lanceolate, I think it evident that these three authorities included, under *A. schimperi*, *A. rupicola* Hope, though it has a very different root-stock. The rhizome, or *sarmentum*, of *A. schimperi* is widely creeping and branching, and, where its growth is not impeded by circumstances, the fronds spring up quite apart; but *A. rupicola* grows in isolated plants: the caudex is thick and erect, or sometimes procumbent, and the stipes are always densely tufted.

The rhizome of *A. schimperi* is densely clothed with bright-brown narrowly lanceolate-acuminate scales; those at the base of stipe few, and darker in colour. Blanford rightly says that the basal portion of the stipe is dark-coloured, though I should say purplish brown, rather than deep purple. Beddome rightly corrects Baker in saying that the frond is only bipinnate—tripinnatifid, or sometimes only bipinnatifid. I have both these forms grown on the same rhizome, and the cutting of their pinnules is very different. Beddome is incorrect, I think, in saying that the frond is "lanceolate, gradually reduced below": the shape may be called broadly lanceolate-acuminate, somewhat truncate at base: Blanford notices this. The rhachises of the pinnæ are winged, with an actual interruption of the wing only in well developed fronds; and the pinnules are decurrent both ways on the rhachis, so that the fern is only just bipinnate. Even in the largest Indian fronds the wing is sometimes unbroken, and it is continuous in the reduced basal pinnæ even when broken in those above. The basal pinnæ are apt to be sterile, or partly so, at their bases.

The specimens of the African and Indian plants in Kew do not exactly agree; and I have noted that the only specimen in the Calcutta Herbarium so named (before I picked out Indian ones in 1896), from T. Moore's Herbarium, ticketed Africa, is different from the Indian plant in cutting and that the pinnæ are opposite. That specimen has no rhizome. But the Indian plant may stand as *A. schimperi* until the African plant is better known.

29. **A. pectinatum**, Wall. Cat. 231, as to type sheet only. *A. filix-femina*, Bernh. (an E. Indian form of), Syn. Fil. 228. *A. filix-femina*, var. 2, pectinata (sp.), Wall., C. R. 492. *Athyrium filix-femina*, var. 2, *pectinata*, Wall., Bedd. H. B. 169. *Athyrium pectinatum*, Wall., Bedd. Suppt. H. B. 36.

PUNJAB: *Chamba*—Ravi Valley, Sao Valley and elsewhere not specified, McDonell; *Kangra V. E.*—4500′, Trotter; *Simla Reg.*—4500-6000′, common, in and about Simla.

N.-W. P.: *D. D. Dist.*—In the Du—2500′, Mussooree 4-6000′: plentiful in several places; *T. Garh.* 4-5000′, Duthie, Gamble; *Kumaun* 4-7000′, frequent.

DISTRIB.—*Asia*: N. Ind. (Him.) Bhután 2-7000′; Bengal—Parasnáth Mt. 4-4500′, *T. T., C. B. Clarke, F. H. Ward* in Herb. *Rev. A. Campbell.*

I have been disappointed that Mr. Baker has not admitted this plant to specific rank; but possibly he has not seen the rhizome which is as widely creeping and branching as is that of *A. schimperi*—a character mainly founded on to distinguish the latter species from *A. filix-femina*. This radical difference in root-stocks in ferns is a distinctive character that seems to be quite unsurmountable. Possibly, accidental plants or cultural varieties of *A. filix-femina* may be found with cutting like that of *A. pectinatum*, but they cannot have a creeping *sarmentum*. Clarke's figure, Plate 68 of his "Review," shows the cutting of the frond well; but, without the rhizome, which he does not even mention, it gives no idea of the appearance of the plant. Beddome's description in his Supplement should be referred to, but his *B. tenellum*, F. S. I., t. 154, which seems to show an erect caudex, cannot be this species. Sometimes, perhaps, fronds spring in tufts from the creeping rhizomes. In large specimens the lower pairs of pinnæ get very distant—four inches and more apart. The plant is very tender, succulent, and brittle in life. The sori are generally very minute, but the cutting of the plant is so fine that there is no room for large sori. The contrast between the habitats in Sikkim—on dry burning slopes to the South, according to Clarke, and, in the Simla Region, in damp ravines, according to Blanford, is very great. The plant, as I know it, grows longest in rich soil in the shade; but I have seen it doing well in the open, and even on dry rocks, though stunted.

30. **A. oxyphyllum**, Hook; Syn. Fil. 228; C. R. 493. *Athyrium oxyphyllum*, Bedd. H. B. 170.

N.-W. P.: *Garhwal—fide* Clarke in "Review"; *Kumaun*—Naini Tal, Davidson 1875, in Herb., Hort. Sahar.; between Dandihát and Karela 5-6000′, Duthie No. 3170 1884; MacLeod 1893 (no locality stated).

DISTRIB.—*Asia*: N. Ind. (Him.) Nepál to Bhután: "very common from Nepál eastwards" (*Clarke*); Assam—Khasia 3-6000′, common, Kohima 5000′, *Clarke*.

This seems to be one of the rarest ferns in North-Western India—only twice or thrice collected, so far as I know. MacLeod's specimens in my possession are very small, simply pinnate, with no involucres. Another small frond, from the same source, may be different: it is truly lanceolate, and the segments are completely covered with ripe sori, among which large reverted involucres are copiously present.

31. **A. fimbriatum**, Hook.; Syn. Fil. 229; C. R. 494. *Athyrium fimbriatum*, Wall. (under Polypodium) Bedd. H. B. 172, and Suppt. H. B. 37, *var. squamatum*.

KASHMIR: Sarpat 10,000′, McDonell and McLeod 1891:—"Water-shed between Jhelum and Kishenganga Valleys, common at 10,000′, never lower: on north slopes only" (MacLeod). *E. Kashmir—fide* Clarke in "Review."

PUNJAB: *Chamba*—Sára 11,000′, Clarke No. 24152, 1874, in Herb. Kew; Ravi Valley 8000′, McDonell, 10,000′, J. Marten 1897; *Kullu*—8-10,000′, Trotter; *Mandi*

State—8-10,000′, Trotter; *Simla Reg.* Jual State, Chor Mt. 10,000′, Collett; Ridge east of Simla 83-10,000′, Collett, Hope, Bliss; Bisáhir—Kushung (or Kasong) Forest 9500′, Lace.

N.-W. P.: *D. D. Dist.*—Jaunsar: Deoban 9000′, Herschel; *T. Garh.*, Nág Tiba Mt. 9000′, Mackinnons; Ganges Valley 9-12,000′ and Jumna Valley 9-10,000′, Duthie; *Brit. Garh.*—above Ramri 8-9000′, Duthie; *Kumaun*—Guinji Pass 8000′, Davidson; 5 stations 7-10,000′, Duthie.

DISTRIB.—*Asia*: N. Ind. (Him.) Bhotán.

Beddome, in the Supplement to his Handbook, has rightly added to the description—"root-stock creeping, stipes solitary, distant," which character distinguishes this species from the next. So do the scales at base of stipe. In *A. fimbriatum*, as the "*Synopsis*" says, these are dark brown: in *A. foliosum* they are bright chesnut, and much more numerous.

I have gathered this fern only in the Simla Region, and at the time, following Blanford, I understood it to be Clarke's *A. Atkinsoni, var.* Andersoni; but I never could separate that fern from *A. fimbriatum*. Blanford has it under Clarke's variety.

On a sheet in the Saharanpur Herbarium, from British Garhwal, I find a note by Mr. Duthie—"used by *Paháris* (Hill men) as a remedy for snake-bite". Doubtless: but would it not be as useful to use a snake as a remedy for the bite of a *Pahári?*

32. **A. foliosum**, Wall. Cat. 339 (or 359); Bedd. Suppt. H. B. 37. "Root stock erect or suberect, stipes approximate; rhachis with a gland at the axis of the pinnæ; stipes and rhachis often red; fronds up to 3 feet high; primary pinnæ 5—8 inches long, generally about 1½ broad, but varying from ¾ inch to 3 inches; lowest secondary pinnule on the superior side of the pinnæ always more or less elongated and often double the size of the others; lowest superior lobe of the pinnule also elongated; sori strictly athyrioid. Bedd. F.B. I., Pl. CCXCV, Wall. Cat. 339, first sheet in Linn. Herb. (the second being *Athyrium macrocarpum*). Clarke, pl. 62, fig. 1, (*sphæropteroides*) a good figure of this plant, but scarcely showing the enlarged lowest secondary pinnule at the superior base of the pinnæ which is most characteristic of this fern, This must, I think, rank as a species, being nearer to *macrocarpum* than to *fimbriatum*."

The above is Colonel Beddome's description.

PUNJAB: *Chamba*—Rávi Valley—near Langera 6000′, McDonell (in Herb. Gamble); *Kangra Vy. Dist.*—Dharmsála 10,000′, Clarke Nos. 23934 and 24361; *Simla Reg.* "above Simla," Bates; Ridge east of Simla 8000′, *fide* Beddome; between Nagkanda and Bághi 8500′, Hope.

N.-W. P.: *Garh.*—Dr. J. L. Stewart; *T. Garh.* Nág. Tiba Mt. 9000′, Mackinnons 1878-79; *Brit. Garh.*, 8-9000′, Duthie No. 5152, 1885; *Kumaun*—Wallich in Herb. Kew: Kalimundi Pass 8000′, S. and W.; Forest near Sosa 8-9000′, Duthie 6255′, 1886; Summit of Dhánkuri Pass 10,500′, Trotter No. 792, 1891; Mangalia Gor—ridge above Ránti, MacLeod 1893.

DISTRIB.—*Asia*: N. Ind. (Him.) Nepál—*Wallich*; Sikkim—*Jerdon*.

As Beddome says, this fern is nearer to *A. macrocarpum* than to *A. fimbriatum*, *i.e.*, as to cutting; but the different rhizome at once separates it from both; and the smaller, often very minute, sori show that it is not *macrocarpum*. I separated, as this species, some specimens in Gamble's Herbarium, from Sikkim and Bhotan, named *A. macrocarpum* and *A. fimbriatum*—the smaller sori being sometimes the chief guide; and some of these, and also McDonell's from Chamba, are hardly bipinnate. One Chamba plant, with fronds only 9—10″ long, is tripinnatifid only near the base, and I was nearly describing it as a new species. Others, again, of the eastern specimens, are almost quadripinnate. The fern is, I think, never flaccid and membranous as some forms of *A. macrocarpum* are. The stipes and rhachises are wiry, though slender. The cutting is very defined and elegant: the sori copious from base to tip.

As to dimensions: my specimen from Tehri Garhwál, given me by the Messrs. Mackinnon, is a portion—the 3½ lowest pair of pinnæ, I think—of a very large frond; the width is about 20½ inches, and the second lowest pair of pinnæ 10 inches long (each) by 4½ inches broad. The frond must have been 6 feet, including stipe—twice the limit Beddome gives.

[*A. procerum*, Wall., Cat. 2203 (*A. umbrosum*, *Sm.*, *var. procerum*, Syn. Fil. 489), said by Mr. Clarke and Colonel Beddome to be very common in the Himalaya, from Kumaun to Bhotán, has not been got west of Nepâl, that I can see.]

Subgenus DIPLAZIUM, *Swartz*.

33. **A. longifolium**, Don; Syn. Fil. 234; C. R. 478.

Diplazium longifolium, Don; Bedd. H. B. 179.

PUNJAB: *Chamba*—McDonell, in list of Ferns identified at Kew; not seen; *Simla Reg.*, Simla and neighbourhood 45-5500′, seven or eight stations, Edgeworth, Bates, Fielding, Gamble, Blanford, Hope, Bliss.

N.-W. P.: *D. D. Dist.*—Mussooree, rare, Duthie 1877, Mackinnons 1878-79, Hope 1881; *Kumaun*—near Naini Tál, Hope 1861, Major Buckley.

DISTRIB.—*Asia*: N. Ind. (Him.) Nepál, *Wallich*; "very restricted in area and nowhere common" (*Clarke* in "Review"); Sikkim—in Herb. *Gamble*, com. *Levingo*. Manipur 6-7000′, *Watt*.

This is undoubtedly a *Diplazium*, as Diplaziums go, and Mr. Clarke has, since the publication of his "Review", in which he placed it under *Euasplenium*, admitted it to be so, in the paper written jointly with Mr. Baker, Journ. Linn. Soc., 8th December 1888, in which it is said—"*In exemplis, a H. Blanford communicatis, J. G. Baker paucos soros diplaziformes invenitit.*" Mr. Gamble has a specimen from Blandford with two or three diplazoid sori on it; and I have two or three fronds from Mr. Bliss on which double sori are

not infrequent: but the paired sori are never of equal length. Beddome's limitation of the sori to the lowest vein of each group does not hold good with regard to Simla and Mussooree specimens; from some of these there are numerous cases of short sori in or near the lobes on the other veinlets. And his figure does not represent these specimens when it shows the lowest superior auricled lobe bare of sori, for in some cases I see a double row of sori in the auricle, consisting of 2—4 pairs on either side of the main vein. The auricle (and sometimes the next lowest segment) has a tendency to be free and in one of Mr. Bliss's specimens it is quite so, and even petiolate.

34. **A. japonicum**, Thumb.; Syn. Fil. 234; C. R. 498. *Diplazium, japonicum*, Thumb., Bedd. H. B. 180.

KASHMIR: Coll. Mardan Ali, 1854, in Herb. Hort., Saharanpur; Panjab 53-5500', Kishenganga Vy. Kerán 5500', McDonell Nos. 33 and 34, 1891.

PUNJAB: *Chamba*—Kalatop Forest 6000', McDonell 1881, *Kangra Vy. Dist.*—Edgew., in Herb. Hort. Kew.; *fide* Trotter in List; *Simla Reg.*—Simla 6000', Blanf., Bliss.

N.-W. P.: T. Garh.—Bhatauli 3-4500', Herschel, Mackinnons, Hope; *Kumaun*—Edgew., Lev., S. & W.; between Ramgarh and Peora, Hope 1861; Booreydar, Davidson 1875; Hawalbagh 4000', Trotter 1891.

DISTRIB.—*Asia*: N. Ind. Assam—Khasia 3000', abundant, *Clarke*; Bengal—Chittagong 200', common, *Clarke*. S. Ind.—Madras Presidency, on the W. Ghâts; Nilgiris 7000', Pulney Hills 7000'; Tinnevelly Hills; Jeypore Hills, west of Vizagapatam, 3-4000' (*Beddome* in H. B.). Manipur, *Clarke*. Burmah, Malaya, China. Japan. Polynesia. Australia. Queensland and Norfolk Island. *Afr.*: Bourbon.

I would add to the description of this fern that the fronds of the N.-W. India plant are dimorphous, *i.e.*, these are fertile fronds which have long stipes, and sterile ones which have short stipes. The long-stiped fronds are always fertile, and the short-stiped—never so. The sterile fronds are generally broader in proportion to their length than the fertile are, and the pinnæ also sometimes broader. A length of rhizome, with both sterile and fertile fronds on it, should always be gathered, or a correct idea of the species will not be got. I feel sure Beddome is wrong, as to the N.-W. Indian *A. japonicum* at least, in saying that the rhizome is "creeping or suberect." It is really always widely-creeping and branching, and sometimes very slender; but occasionally several fronds, sterile and fertile, are thrown up near each other in an apparent tuft. On some fronds few diplazoid sori are found; and I have sometimes seen hippocrepiform sori, *i.e.*, with involucre crossing the vein, unbroken and continuing down the other side of the vein for about half the length that they have before crossing. Other variations in the sori could be cited. I do not consider this species to be much more of a *Diplazium* than *A. thelypteroides* and *A. McDonelli* are.

Under the head of "Distribution" the Synopsis gives the Himalaya generally, and the other authorities give Nepál as the Eastern limit; but the same, comparatively glabrous, plant is got in Sikkim, for in Mr. Gamble's collection I find three sheets from Goke and Singtam (Dárjiling) and from the Jeylep Road; and there is also a sheet from Manipur—Nonjaibang 750′, *Clarke* No. 42338, 1885. I have a specimen of Clarke's from West Manipur 1000′, 1885. *D. lasiopteris*, Kunze, which Clarke, and (whom following) Beddome, unite with *A. japonicum*, is rougher and coarser looking, and *D. thwaitesii*, A. Br., and *A. decussatum*, Wall. (*D. polyrhizon*, Baker), though also so united by the same authorities, seem to have their differences. Beddome's figure, F. B. T. 292 of the latter, shows an isolated plant with an erect caudex, but he says he has found typical *decussatum* with the rhizome creeping, though it is generally erect: this shows that he has confounded two distinct species, for this statement involves a physical impossibility. A fern with a slow growing, erect caudex may be fixed in a recumbent position and then grow horizontally; but that is quite a different case from that of a plant with a thin quick growing rhizome sarmentum which creeps and branches underground, and throws up fronds at intervals, forming a bed. But as no one has attributed any of these three similar plants to N.-W. India, I need not further deal with them.

35. **A. torrentium**, C. B. Clarke in "Rev." 500, f. 64 (fig. 2 excluded); Journ. Linn. Soc., 1888.

PUNJAB: *Simla Reg.*—Near Simla "either Chadwick Falls at 5800? or Samáli Nála at 4500′, Blanf.

DISTRIB.—*Asia*: N. Ind. (Him.)—Sikkim, "on margins of torrents, rare," *Clarke*.

Blanford, who figures a small frond of this (Pl. XVI., Journ. Asiat. Soc., Bengal, 1888), says he gives this species on Mr. Clarke's authority, but he had regarded it as merely a simple form of *A. polypodioides*, Mett. Clarke and Baker have given Simla, Alt. 6000 ped., H. Blanford, as an additional habitat, in their joint paper referred to above. The specimen is in Kew. Beddome seems to consider this plant as merely a variety or form of *A. polypodioides*.

36. **A. polypodioides** Mett.; Syn. Fil. 238; Cl. Rev. 501. *Diplazium polypodioides*, Mett., Bedd. H. B. 184.

KASHMIR: Clarke; Trotter in "List"; McDonell in Herb., Gamble.

PUNJAB: *Hazara*—The Gullies 7000′, Murree 7000′, Trotter. *Chamba*—3-7000′, Clarke; McDonell; Trotter 5000′; 6-10,000′, J. Marten 1897; *Kullu*—Trotter, Coventry; *Mandi State*—7-8000′, Trotter; *Simla Reg.*—4-6000′, common about Simla; Pábar Vy. Edgew.; Kunáwar—Dr. A. Grant.

N.-W. P.: *D. D. Dist.*—Jaunsar 6-7500′, Gammie, Gamble; Mussooree 55-6500″ common; *T. Garh.*—4500′-12,000′, Duthie, Gamble; *Brit. Garh.*—7-8000′, Duthie; *Kumaun*—4—8000′, common.

DISTRIB.—*Asia*: N. Ind. (Him.)—Nepál?; Sikkim and Bhotán, 2000′ and upward, very common; Assam—Khasia 2-6000′, very common; Kohima 5500′, *Clarke*. S. Ind.—W. Forests up to 6000′. Ceylon. Malaya. Australia.

This fern varies much in size and cutting, and also in length of sori, but I think all the N.-W. Indian plants are the same. On seeing them growing in many places, in the Simla Region, Mussooree, and Kumaun, it never struck me that there was any difference. Gamble has named his "No. 25097, Jaunsar 7000′," *Diplazium latifolium*; but the venation is quite different in the two species, and attention to that distinction should prevent any confusion. In all the specimens of *A. latifolium* I have seen the veinlets are simple, though Beddome says simple or forked; the veinlets of *A. polypodioides* are always forked. The venation of Gamble's plant from Jaunsar is that of *A. polypodioides*. Specimens from Simla, marked var. 3, *sublatifolia*, Clarke, also have the venation of the type. This being so, I cannot understand why Clarke says—"This series of plants distinctly approaches *A. latifolium*"; nor why Beddome says—"His (Clarke's) variety *sublatifolia* runs into *latifolia*, and rather belongs to that species, if the two are really distinct, which is very doubtful."

The involucres of *A. polypodioides* are very fugacious, and I believe they are sometimes absent in an early stage of growth. Both Levinge and Trotter were tempted by this to think of *Gymnogramme*. The Mackinnons have shown me plants in cultivation which were quite exinvolucrate. The young fronds are edible. Trotter says the Punjab Hill people eat them like spinach, and call them *Kasmor*. About Mussooree, also, the fronds are eaten, and called *lingra*.

37. **A. squamigerum**, Mett., in Miguel's Annales, Vol. II. 239; Syn. Fil. 237. Plate XXVI.

KASHMIR: Kishenganga Valley, Keran Nála 8000′, McDonell, 3rd September 1891; Kajliban, in moist forest, Duthie, No. 12630, 1892; below Gurais 8-9000′, Duthie No. 14100, 29th September 1893; Kachal 8000′, and Donari Nála 7000′, McDonell 1894.

PUNJAB: *Chamba* State 8000′, J. Marten 1897; *Simla Reg.*—Giri Valley, in Raiengarh Forests 6500′, Gamble, July 1898.

N.-W. P.: *Kumaun*—near Kathi 7800′, S. & W. 1848; Dipl. No. 4 on ticket; Pindar Gorge—Khati 7000′, Trotter, 9th September 1891.

DISTRIB.—*Asia*: China—Patung District, *Henry*; Szechwan (Omei) *Faber*. Japan Siebold, Oldham, Robinson, Bissett, Maries, Hancock, Dickins, Faurie.

I noted this fern as being new to me in Mr. Trotter's collection made in Kumaun in 1891, and brought by him then to Mussooree, and soon afterwards I received a specimen from Kashmir, collected by Mr. McDonell, as it turned out, six days before Mr. Trotter got his specimen, and, though they somewhat differed, I referred them to the same species. I described and named the plant as *A. Trotteri*, under the impression that Mr. Trotter was the first to gather it: there was already an *A. McDonelli*, Bedd., and Mr. Trotter well deserved the compliment. I sent the description to a London botanical periodical for publication, but it never appeared. As will be seen, however, from the entry above, under the habitat "Kumaun", both Trotter and McDonell must yield place as discoverers to Strachey and Winterbottom, who found the fern in 1848, at what is probably almost exactly Trotter's station, there being only a difference in the spelling of the vernacular name and an estimated difference of only 800 feet in the altitude. As Mr. Trotter was always very particular about the spelling of the names of localities, I think it probable that Strachey and Winterbottom's locality was Kháti, and not Káthi. Their specimen, which is in the Herbarium of the Royal Botanic Garden of Calcutta, has no rhizome; but otherwise it agrees exactly with Trotter's. It is distinctly a *Diplozium*, with curved sori long for their breadth; and it differs also in cutting from *Athyrium crenatum*, Rupr., the habitats recorded for which are—Scandinavia, by way of Siberia, to Japan. Mr. McDonell collected some more specimens of his plant in Kashmir in 1894, and sent one, with other ferns, to Colonel Beddome, who reduced it to *A. crenatum*, Rupr., saying that it exactly agreed with Japan specimens. Colonel Beddome had not then seen the Kumaun plant. But Mr. McDonell's Kashmir specimens, though they are smaller, more compound in cutting, and more delicate, agree in rhizome and sori with the Japan specimens of *A. equamigerum*, with which species I became acquainted on returning to England in 1896. Mr. McDonell wrote in 1895—"As to *Trotteri*, it seemed to me that the plant I got in September 1891 is not quite the same as that I sent last year; the former was growing in a cave, the latter is common on hill sides, growing with *Filix-mas*, under cover of trees, in shady places."

Mr. Marten's specimens from Chamba, and Mr. Gamble's from the Raiengarh Forests, are large, and intermediate in cutting between the Kumaun and the Kashmir plants. Mr. Duthie's Kashmir specimens, No. 12630, are more like *A. crenatum*, though some of them differ considerably. His No. 14100 quite matches a specimen from Japan, Yezo—*Forêts de Yubari*, Faurie No. 8111, 3rd July 1892; but the rhizomes are not complete enough.

Pending the collection of further material in the Himalaya, I have given up the attempt to differentiate the three forms, and I give the following description which is intended to cover all the Indian specimens :—

"*Rhizome* more or less slender, widely creeping and branching, black, sending up fronds 1 inch, more or less, apart, stipes sometimes in clusters. *Stipes* up to 1 foot or more long, slender but wiry, their bases clothed with very dark brown large lanceolate-acuminate scales, extending a short way up the stipes and then becoming scarce. *Rhachis* with a few scattered scales the same as those at the base of the stipes, but smaller, and with tufts of linear scales in the axils. *Frond* subdeltoid, bipinnate. *Pinnæ* markedly petiolate, about 13 pairs besides the acuminate pinnatifid apex—lower 5—6 pairs almost opposite, lanceolate-acuminate, lowest $1\frac{1}{2}$—2 in. br., 2 inches apart, all distant. *Pinnules* 10—11 pairs besides the crenate apex, distant, patent, deeply cut into rectangular rounded segments towards the base, and crenated towards the acuminate apex, margins scarcely toothed. *Veins*—3—5 pairs in a segment, curved and often forked. *Sori* $\frac{1}{16}$—$\frac{3}{32}$ inches long, very narrow, curved like the veins, up to five in number in lower segments and in others one on each lowest anterior veinlet, pointing to the sinus between the segments, and forming a row curving outwards on each side of the costa : some of the lowest diplazoid, or semidiplazoid. *Involucres* persistent, and sometimes much broader than the sorus."

Mettenius's description was written from a fragment collected in Japan by Siebold : it began—"Rhizoma ?", and ended—"indusium membranaceum tenerum integerrimum."

Mr. Baker's description in the *Synopsis* is :—

"238 A. (*Dipl.*) *squamigerum*, Mett.; *st.* 6 ins. or more long, straw-coloured, slender, with small scattered, nearly black lanceolate scales throughout; *fr.* 12—15 ins. long by nearly as broad, deltoid, lower pinnæ 6—9 ins. long, 2—$2\frac{1}{2}$ in. broad pinnate except at the apex ; pinnules $1\frac{1}{2}$ ins. long, $\frac{3}{4}$ ins. broad, the point blunt, the edge broadly lobed, the lower lobes $\frac{1}{4}$ in. broad entire ; *texture* herbaceous ; *rachis* slender, stramineous, chaffy below; *veins* subflabellate, the lower veinlets of the lobes with one or two lateral curved forks on each side ; *sori* linear, curved, falling far short of the edge, the lowest 2 lin. long. Mett. Fil. Ind. 2, p. 239."

"Hab.—Japan, *Oldham*, *Siebold*, *Robinson*."

Asplenium (Athyr.) *crenatum* Rupr. resembles *A.* (*Dipl.*) *squamigerum* in having a black creeping rhizome, and broad ovate-lanceolate dark-coloured scales at the base of the stipes ; and also in the crenate pinnules. The rhizome of some specimens of the Kashmir plant is almost as slender as that of *A. crenatum* : that of others, and of the Japan

and Kumaun plants, seems to be stouter, and sometimes to throw up fronds in tufts ; but there are few examples with rhizomes attached. A Japan specimen in Kew of *A. squamigerum*, from Hyachine, Faurie No. 13583, 24th August 1894, differs somewhat, as to the frond, from his No. 8111 from the Forests of Yubari in Yezo, mentioned above, which quite matches Duthie's No. 14100 from Kashmir. On the same sheet with Faurie's No. 13583, is a rhizome, some inches in length, which is black, creeping and branching, not slender, with stipes in tufts; but this is disconnected from the pale-coloured stipes of the mounted frond, and the stipes itself is broken. Even supposing that rhizome does not belong to that particular frond, it is valuable, as showing that the rhizomes of the Japan and Kumaun plants are the same. Of course, great similarity, or even identity, of rhizome does not of itself prove identity of species : some other characters must agree. In the " Synopsis " *A. crenatum* is said to have stipes " scattered, firm, erect," which implies a widely-creeping rhizome, but does not explicitly negative the supposition that it, like the Asiatic plants, also at intervals throws up fronds in tufts. The amount of " lamina " in a frond of *A. crenatum* is much less than in either the Himalaya or the Japan plants, and the sori seem never so long as in these : Baker says— " oblong, usually nearly straight, often double," and as to *A. squamigerum*— " linear, curved .....the lowest 2 lin. long." But the involucres in Japanese specimens of *A. squamigerum* are often very broad in comparison with the sori, and, as Mettenius said, membranaceous, tender, entire.

I lately asked Dr. H. Christ, of Basel, an eminent pteridologist, whether he could connect *A. squamigerum* with *A. crenatum*, giving him at the same time particulars of the recent discoveries in the Himalaya, and he replied as follows :—

" J'ai le premier (A. crenatum, Rupr.) en echantillons nombreux du Nord : finlande, Scandinavie : plante petite : 3rd dec. stipe grèle : ecailles peu mombreuses, *mais larges* : *noires*, segments petits, sores athyrioides, courts : plante fragile, rhizome presque filiforme, faible.

" J'ai la plante du Japon *l.* Faurie 11,578 et 13,583 : toutes les dimensions doubles ou triples : plants 6 Dec. et au deta, stipe jusqu' à 3 mill. en diamêtre, ecailles brunes, lanceolées, nombreuses : segments grands, sores jusqu' á un demi-centimêtre, souvent diplazoides, rhizome plus épais, rampant, mais il semble que les stipes sont en peu en touffe et non solitaires comme dans la plante du Nord.

" Le plus grand echantillon est celui de Tosa, l. Makimo : fronde de 50 cent. sans tige.

" Je crois que la plante de " Inde (que je n'ai pas vue !) doit être la plante du Japon, mais non la plante du Nord. Je ne nie pas la grande affinite dés

deux plantes, etje suis disposé de voir dáns cette dernière une *sousespece* boreale de la première..... ".

Colonel Beddome lately examined along with me all the material available in Kew, including specimens Mr. Gamble had lent me, and he came to the same conclusion as before, namely, that *Diplazium trotteri* (*i.e.*, *A. squamigerum*) is certainly *A. crenatum*—the Kashmir plant being intermediate The Kew bundle of *Dipl. squamigerum* he considers to be a mixture ; one specimen being " certainly typical *A. crenatum* (tripinnate), but one from Japan, with very large prominent indusiæ may be quite a different thing." I think Colonel Beddome is mistaken in styling any of the forms—whether *crenatum*, *trotteri*, or *squamigerum* as tripinnate. No specimen I have seen is so : the utmost development is that the lowest pinnæ are cut down, at the base, nearly to the secondary rhachis—one cannot even say to a winged rhachis. One Norwegian specimen of *A. crenatum* in Kew has sori longer than they usually appear, and some diplazioid ; but, as most of the specimens are fully ripe, the involucres are generally obscured.

Since the above was re-written I have again gone over the material, and while I still think all the Himalayan material must be identified as *A. squamigerum*, I now consider it possible that in spreading westward to Norway the Japanese plant has lost in length of sori, and become *A. crenatum*.

38. **A. multicaudatum**, Wall., Cat. 229 (*A. Athyrium*) *umbrosum* J. Sm., var. 2. *multicaudatum* Wall. (*D. Jerdoni*, Beld. F. B. I., t. 327), Himalayas, Syn. Fil. 489. *A. multicaudatum*, Wall. Cat. 229. C. R. 502. *Diplazium umbrosum*, J. Smith under *Athyrium*, var. *multicaudatum*, Wall., Bedd. H B. 190.

PUNJAB : *Chamba*—McDonell (in list of Chamba ferns identified at Kew) ; *Simla Reg.*—below Simla (*fide* Dr. King and Mr. Clarke), Blanf. in "List" ; Sirmur State 1832, in Herb. Hort. Calcutta.

N.-W P. : *D D. Dist.*—Near Mussooree, Dr. G. King 1869, 4-5000', Herschel 1879 ; Sowarna Nála 4-5000', Mackinnons 1878-79, P. W Mackinnon and Hope 1881 ; " Mossy Falls" 5000', Hope 1885 and 87 and 1895 ; *Kumaun*—A. O. Hume ; Káli Valley 2-3000', Duthie 1884.

DISTRIB.—*Asia* : N. Ind. (Him.) Nepál, *Wallich*, Sikkim and Bhotán ; Assam—Khasia 1-5000' ; Chittagong (in the plains of Bengal) 20'—2000', *Clarke*.

I do not remember having seen McDonell's specimens from Chamba, but I believe his list to be generally correct. At Mussooree *A. multicaudatum* grows in beds, and fertile fronds are comparatively rare, and often sparsely soriferous : the creeping rhizome provides for the perpetuation of the species in each locality. None of Gamble's specimens from Sikkim seem quite the same as the Mussooree plant and some seem considerably different, having longer sori, with narrow persistent involucres. On the Mussooree plant it is difficult to find involucres, at least on mature fronds ; but I can make out that many sori

are diplazoid ; and this is evident also on some of Gamble's specimens and on a specimen from Sikkim in Kew, Hook *fil.* Some of Wallich's Nepal specimens differ from the Mussooree plant (and from each other) : others are identical.

Mr. Baker, at p. 489, Syn. Fil., 2nd. Ed., under *A. umbrosum* J. Sm., says *A.* (*Dipl*). *Griffithii*, No. 245, is perhaps a variety. I think there is not the slightest doubt that *A. Griffithii*, Baker, is identical with *A. multicaudatum*, Wall. I have not myself gathered *A. Griffithii*, but there is abundant material in Kew from which a conclusion can be arrived at. On several sheets (*ex* Herb. Hort. Bot., Calc.) of specimens collected by him in the Darjiling District at low elevations, his Nos. 9006 and 9079, 1869, Mr. Clarke has written, "Root-stock creeping extensively and throwing up solitary fronds : sori few, scattered, and few of these diplazoid." These are exactly the Mussooree plant, which is certainly Wallich's *A. multicaudatum*. On one sheet of this series, ticketed "*A. Griffithii*, Baker, Rishap, 3000′, Darjiling, 4-9-69, No. 9006," and named finally by Mr. Clarke, on 11-1-79, *A. multicaudatum*, Wall., Mr. Baker has pencilled "Madeiran umbrosum." He has also pinned on this sheet a paper as follows :—"Clarke, Nov. 1875, seems to distinguish.

"1 Common species is (has ?) Allantodioid sori.

"Another sere (series ?) of similar structure, but white and with a scabrous stem and rhachis, appears to be *A. umbrosum*, J. Sm., but very unlike *A. australe*.

"*Australe*, Brack., from Thwaites—not Bengal, at all.

"Bengal fern which Dr. King and others call *A. australe* is for me *D. Jerdoni*, or *Griffithii* (I think the former). These two have creeping rhizomes which send up distant solitary fronds, the stipe rising through the earth."

I consider it quite a mistake to put this fern under *Athyrium umbrosum*, a Madeira fern, which is quite different in shape of frond, as well as of sorus and involucre—not to speak of rhizome. Specimens of *A. umbrosum* in herbaria are generally incomplete, and the descriptions say nothing as to the nature of the caudex ; but in a privately printed account of "An Easter Holiday in Gran Canaria and Madeira", 1893, written by one whom I know to be a keen observer and collector, I find this allusion to the plant—from which I gather that it is subarborescent, and must have a stout erect caudex :—"At one waterfall" (in the *Levada do furado*) "I noticed *Asplenium umbrosum* seven feet in length and as thick as a miniature tree." The young plants growing in the Kew houses have fronds in tufts, and certainly no creeping sarmentum. *A. umbrosum* has always, I think, an ovate or lanceolate frond : *A. multicaudatum*—a subdeltoid frond, with the lowest pair of pinnæ sometimes hardly less than the next above which are the longest. The involucres of *A. umbrosum* are described by Hooker and Baker as being "large, tumid, membranous." Those of *A. multicaudatum* are very small and narrow, so far as is visible. Beddome

gives *Dipl. Jerdoni*, Bedd., and *D. Griffithii*, Baker, as synonyms, and Clarke these, and also *A. spectabile*, Wall., Cat. 237[A]—a fern which is not mentioned in either the *Synopsis* or Beddome.

This seems to be one of the instances in which descriptions of old species are ltered or re-written, in new books, so as to include subsequently discovered and sometimes very different plants, or to fit the theories of the later authors—a very reprehensible practice, in my opinion.

Subgenus—ANISOGONIUM, *Presl.*

39. **A. esculentum**, Presl.; Syn. Fil. 244; C. R. 503; *Anisogonium esculentum*, Presl.; Bedd. H. B. 192.

PUNJAB: *Chamba*—McDonell; *Kullu*—Trotter, twice collected, the 1-pinnate form.

N.-W. P.: *D. D. Dist.*—The Dehra Valley 1000′—2500′: very common near water; *T. Garh.*—Ganges Valley; Duthie; *Kumaun*—5-7000′, S. & W., Duthie, MacLeod.

DISTRIB.—*Asia*: N. Ind. (Him.)—Nepál, *Wallich*; Sikkim 3500′, *Gamble*; plains of Assam and Bengal, and Parasnáth Mt. 2500′, very common in Bengal. Centr. Prov. Ind.—Pachmarhi. S. Ind.—"Common in the plains on the western side, up to 3000′ (*Beddome*). Ceylon. Malay Penins, and Isles. Java. Moluccas. Celebes. New Guinea. Tonkin. Hainan. Formosa. Hongkong. Philippines. Admiralty Isles. Samoa. Viti.

Fronds either simply pinnate, and then more or less lobed and toothed, or completely bipinnate with the pinnules again similarly lobed and toothed, but with a simply pinnate apex with up to 10—12 pairs of pinnæ; *or*—with only one or two pairs below pinnate or partly so. The simply pinnate fronds are probably from young root stocks, and have pinnæ varying from 2½ to 5 ins. in length and from ½ to 1¼ ins. in breadth; but I think both forms of frond are to be found on the same root-stock. In large bipinnate frond the lowest pinnæ are very distant, and sometimes simple and short. The root-stock is, as the books say, subarborescent; the roots are black and wiry, and go deep into the ground. The plant loves ditches and swamps, and silty soil by the edges of streams. It is very common in the Dehra Dun where I have seen it in large bushes on the banks of rivers, and also in swamps among gigantic grasses—in separate plants, growing 9 to 12 feet high, with caudices 6—12 inches high.

The occurrence of this fern in North-West India was first recorded by me in the Catalogue of Ferns in the Saharanpur Herbarium.

Subgenus HEMIDICTYUM, *Presl.*

40. **A. Ceterach**, L.; Syn. Fil. 245; Cl. Rev. 504. *Hemidictyum Ceterach*, L.; Bedd. H. B. 44.

AFGHAN.—Griffith; *Kurram Vy.*—rocks overhanging Karriah River; rare, Aitch., 1897.

TRANS-IND., P. States: *Baraul and Swát*—3 stations 4-7000′, General Gatacre.

KASHMIR : Jacquem.; Hook. fil. et Thoms 1848; *Gilgit Dist.*—8000′, Tanner, 1880; *Astor Dist.*—8-9000′, Duthie; Sind and Jhelum Vys., Aitch., 1878 (?); Jhelam and Kishenganga Vys. 5000′ and upwards, very common, Trotter, MacLeod; Takht-i-Sulimán 6000′, Lev., Trotter, MacLeod; Gund 7500′, Gammie; Ladrawan in Loláb, MacLeod; Barwan 5600′, McDonell; *Kishtwar*—3500′, Clarke, 1876

PUNJAB : *Hazára*—Kagán Valley, 5000′, Trotter, 1891; Malkandi, 4500′, Duthie's collector 1897; Black Mt. 5000′, Oertel, 1891. *Chamba*—Upper Chenab Vy. 8000′, Baden-Powell, 1879 (perhaps in Kashmir); Rávi Valley, 7000′, common, McDonell, 1881; *Kullu*—Sarl ali Valley, Edge. ?

N.-W. P.: *T. Garh.*—Ganges Valley : Jangla 8-9000′, Duthie, 1883.

DISTRIB.—*Europe*: in many parts of Germany, in Switzerland, the Tyrol, Hungary, Dalwatia, the Caucasus, Belgium, France, Spain, Italy, Greece. It is absent from Scandinavia, Northern Russia, Bohemia, and Austria" (*Britten*, in European Ferns). Lago di Garda, Austria, *Levinge*. In Britain, in all or nearly all the southern, northern, and western counties; "in Somersetshire and Devonshire it is especially abundant; in Scotland it is much less frequent"—chiefly in the West and South-West; frequent in Ireland, though local (*Britten*). *Asia*; Palestine, Persia. *Afr.*: Canaries, Madeira and Cape Verd Islands; Morocco, Algiers, Abyssinia, Cape of Good Hope.

Genus 21. ACTINIOPTERIS, *Link.*

1. **A. radiata**, Link. (for the type—*Acrostichum dichotomum*, Forshk., is the oldest name). Syn. Fil. 246. *A. dichotoma*, Bedd., C. R. 505. *A. dichotoma*, Forshk. (under *Acrostichum*), Bedd. H. B. 197.

AFGHAN.: *Kabul—fide* Clarke in "Review."

PUNJAB: *Delhi Dist.*—"Dry rocky places at Delhi and along the Jumna". Trotter in "List"; *Gurgaon Dist.*—Outliers of Aravalli Mts.; "abundant on north side of Khol Mt., between Karnál and Rewari, J. R. Drummond.

N.-W. P.: *Saharanpur Dist.*—Saharanpur, Dr. Jameson (in Herb. Hort., Sahar.), Duthie, 1881.

Agra Dist.: City of Agra—"Plentifully on old walls, 8th June 1825" (ticket in Wallich's writing?): on another ticket—"19?. *Asplenium radiatum*—Agra, super mures, 1825." in Herb. Hort. Kew; "Walls of City of Agra, 8th June 1825", Wallich?, in Herb. Hort. Calc.; Jharna near Agra, Sahar. collectors June 1842; *Moradabad Dist.—fide* Clarke in "Review"; *Jhansi Dist.*—Duthie, 1883.

DISTRIB.—*Asia*: Mount Sinai, Arabia, Persia.—Cent. Ind.—Bagelkhand, *Hope*, 1860; Cent. Prov., Ind.—Khandwa Dist., *A. E. Lowrie*, very large; Rajputana—Taragarh Hill, Mt. Abu 3700′, *King*. Penins. of Ind., in dry rocky places below 3000 ft. elevation (*Beddome* in H. B.); Maisur 10″ long. Ceylon. *Afr.*: Angola, Upper Egypt, Abyssinia, Socotra, Zumbesiland, Macalisberg, Mascaren Isles.

A. australis, Link, seems to me a different species, but it is not found in British India, unless specimens in Gamble's collection, "from the outer hills of East Nepal, 1880," got by his native collector, be it. Specimens of the type, in Gamble's collection, from the Madras Presidency, show that the rhizome is sometimes procumbent, but with stipes very approximate: scales at base of stipe dark-brown, linear: scales sparsely clothing the stipe, paler, and hair-like.

DESCRIPTIONS OF NEW GENERA AND SPECIES OF *HYMENOPTERA* COLLECTED BY MAJOR C. S. NURSE AT DEESA, SIMLA AND FEROZEPORE.

By P. Cameron.

Part I.

[*With a Plate.*]

(*Read before the Bombay Natural History Society, 11th Dec. 1900.*)

In this paper I have described some new genera and species of *Hymenoptera* taken by Major C. S. Nurse, I. S. C. Apart from the new genera, the most interesting of Major Nurse's discoveries is the undescribed species of *Meira*—a genus not hitherto recorded from India, and of which only a few species are known from the South of Europe and the North of Africa. Major Nurse has also been able to give us the first record of the rearing of a species of *Mutilla* in India, and, what is of as much importance, he has reared both sexes. *Mutilla* is probably one of the largest genera of *Aculeate Hymenoptera*, and is fast becoming utterly unwieldy from the fact of the males and females having to be treated as distinct species.

FOSSORES.

MUTILLIDÆ.

Mutilla climia, *sp. nov.*

Nigra, dense albo pilosa, alis fusco violaceis, basi free hyalinis; stigmate pallido, magno. ♂

Length.—7-8 mm.

Habitat.—Deesa.

Antennæ black, the flagellum brownish on the lower side, the scape thickly covered with white pubescence. Head black, shining, thickly covered with long white hair, which is longest on the vertex; the front and vertex are closely and distinctly punctured; the apex of the clypeus is piceous. Mandibles black. shining, a piceous band near the middle, the palpi black. Thorax black, thickly covered with white hair; the meso- and pro-notum closely punctured, the latter more coarsely than the former. Scutellum closely rugose, the middle coarsely aciculated. Median segment closely and uniformly reticulated. Pleuræ closely, rugosely punctured. Wings fuscous-violaceous, the base and the anterior wings more hyaline in tint; the radial cellule is small, the radius roundly curved from the first transverse cubital

nervure; the basal abscissa is straight, oblique; there are only two transverse cubital nervures; the first is straight and oblique, the second is roundly curved outwardly; there is only one recurrent nervure; the third transverse cubital nervure is curved down, and then runs along parallel with the cubitus. Legs black, covered with white hair; the spurs black. Abdomen black, thickly covered with long white hair; the apex of the second, the third entirely and the others more or less covered with white pubescence; the pygidium is not defined; the apex of the segment is depressed, smooth, bare and shining; the apex transverse with the sides broadly rounded; the hypopygium has the apical half smooth, the basal punctured; the ventral keel has a small tooth at the apex. The petiole is narrowed at the base, where it projects on either side into an oblique tooth; it becomes gradually broader to the apex.

This species comes very near to *M. japhia* here described; it may be known from it by the median segment being uniformly reticulated, there being no clear space in the middle at the base; the wings have a more decided violaceous tinge; the second cubital cellule is smaller; the second transverse cubital nervure has a much more distinctly rounded curve, and is more oblique; it is also a smaller species, and the front is not reticulated.

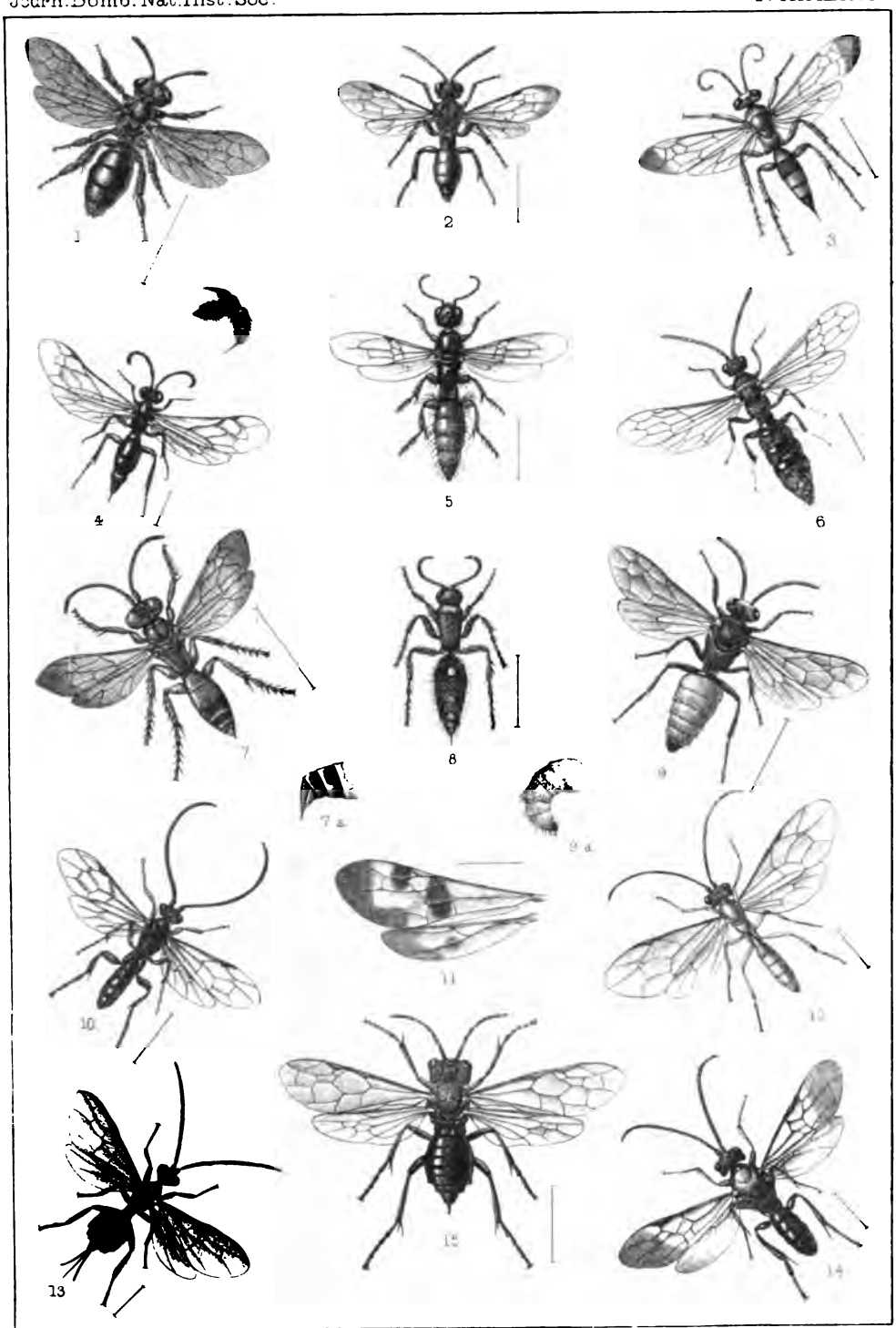
MUTILLA JAPHIA, *sp. nov.*

Nigra, dense albo hirsuta; fronte reticulato, basi metanoto laevo; alis hyalinis, apice fere fumatis. ♂

Length.—8 mm.

Habitat.—Deesa.

Antennæ stout; the scape thickly covered with white pubescence; the flagellum with a pale down; the third joint is not much longer than the second and about one-half the length of the fourth. The front, including the eye incision, is closely reticulated; the vertex strongly and deeply punctured, except behind the ocelli, where the punctuation is weaker; the front and vertex are covered with long white pubescence; the face is opaque, coarsely alutaceous and covered with long white hair. Pro- and meso-notum coarsely and deeply punctured; the scutellum is more closely, more rugosely punctured. Median segment reticulated, except in the middle above the top of the apical slope, where it is smooth, except for some irregular, broken keels. Pleuræ smooth and shining; the raised middle part of the meso-notum coarsely punctured. Legs thickly covered with white hair; the



West, Newman lith.

HYMENOPTERA FROM DEESA & SIMLA.

calcaria pale. Wings hyaline; the apex smoky; th e nervures black the third transverse cubital nervure is obliterated; the cubitus obliterated beyond the second transverse cubital nervure. The petiole and second segment are thickly covered with long white hair, as are also the others, which have also their apices fringed with depressed white hair. The post-petiole is strongly punctured and clearly separated; the ventral keel is straight and of uniform elevation.

MUTILLA ACASTA, *sp. nov.*

Nigra, thorace rufo; alis hyalinis, nervis fuscis. ♂

Length.—7 mm.

Habitat.—Simla.

Antennæ deep black; the scape covered with long white hair. Head as wide as the thorax, shining; above the antennæ closely and distinctly punctured and covered with long white hair; the middle of the front is smooth. Eyes oval, not incised on the inner side. Mandibles curved, broad, ending on the lower side in a sharp, somewhat triangular, clearly separated tooth. Thorax entirely ferruginous; the base rounded. Meso-notum strongly and uniformly punctured and covered with long pale hair; there are no furrows on it. Scutellum more closely punctured than the meso-notum. Median segment with a gradually rounded slope, closely reticulated all over; the reticulations at the base only slightly larger than the others. Wings hyaline, only slightly infuscated towards the apex; the stigma is black; the nervures fuscous; the basal abscissa of the radius is straight and oblique, the apical roundly curved; the first transverse cubital nervure is straight and oblique, the second rounded, the third obliterated; the first recurrent nervure is received near the apex of the basal third of the cellule; the second is faint, almost obliterated, and is received shortly beyond the second transverse cubital nervure; the transverse median nervure is received distinctly beyond the transverse basal nervure; the nervures in the hind wings are either faint or obliterated. Legs black, covered with white hair; the calcaria white. Abdomen black, covered, but not thickly, with long white hair; the second ventral segment is closely punctured; the basal three-fourths keeled in the middle; the keel ends in a triangular tooth; there is no distinct keel on the underside of the petiole; the pygidium is closely punctured and not keeled laterally; the epipygium is dilated in the middle; the basal and apical slopes are straight and oblique.

This species does not fit well into any of the sections of *Mutilla* as defined by recent writers, *e.g.*, M. Ernest André. It appears to be intermediate between *Cystomutilla* and *Dasylabris*; it has the stigma fairly well developed and the abdomen subpetiolated as in the former, but there are no furrows on the meso-notum; from *Dasylabris* it may be known by the abdomen not being clearly petiolated. It cannot very well be confounded with any of the known Indian species, being easily known by there being only two transverse cubital nervures, by the curved mandibles with only one apical tooth, by the transverse basal nervure not being interstitial, and by the almost sessile abdomen.

MUTILLA DIOMEDA, *sp. nov.*

Nigra, dense albo pilosa; thorace rufo; alis fusco-violaceis, basi fere hyalinis, nervis nigris, ♂

Length.—10 mm.

Habitat.—Simla.

Antennæ black, stout, covered thickly with microscopic pile; the scape with longish white hair. Head distinctly narrower than the thorax; the front and vertex rugosely punctured: the ocellar region smooth, raised and bordered laterally by a smooth space; the front bears in the centre a wide, but not very deep, furrow; the front thickly covered with white pubescence and more sparsely with longish white hair; the vertex more sparsely with long white and black hairs. Antennal tubercles rufous. Clypeus roundly, but not deeply, incised in the middle; aciculated. Mandibles black, their base thickly covered with long white hair. Palpi black, thickly covered with white hair. Thorax rufous, the sternum black; pro-notum smooth, transverse at the base; meso-notum coarsely and deeply punctured, the punctures of almost equal size throughout; the two furrows are deep. Scutellum not quite so strongly punctured as the meso-notum, but quite as closely; its base smooth and with an oblique slope. The median segment has a gradually rounded slope, and is closely reticulated; at the base are two large areæ with a smaller, shorter area on the sides; these areæ are irregular in shape. Wings fuscous, with a violaceous tinge; at the base they are paler, more hyaline; the basal abscissa of the radius is straight, oblique and thinner than the rest of it; the apical is roundly curved; the extreme apex straighter than the lower portion; the second transverse cubital

nervure is sharply elbowed above the middle; the third transverse cubital is distinct throughout, but thinner than the others. Legs black, thickly covered with white hair; the calcaria white. Abdomen black; the four basal segments banded with long white hair, the others with long black hair; the petiole and the second segment are closely and strongly punctured; the ventral keel on the petiole is narrow and straight, not projecting much. The last segment is closely and strongly punctured, except in the middle at the apex; below it is punctured strongly and closely; it has no keels, and bears near the base a transverse smooth furrow.

This species is allied to *M. antennata*, Smith, which I only know from the descriptions of Smith and Bingham; the description given by both authors of the meta-thorax does not fit our species at all; it is said to be covered with large shallow punctures and having a smooth channel down the centre, which has on each side an elevated keel; "the palpi are ferruginous, the antennæ fusco-ferruginous," &c.

MUTILLA REGIA, Smith. (P. l. fig. 8 ♀. 9-9 *a* ♂.)

Captain Nurse has reared from adjacent cells in a nest of *Eumenes escuriens* a ♀ *Mutilla regia*, Smith, and a ♂ *Mutilla* which is, doubtless, the other sex. As I cannot make out that this ♂ has been described under any name, I give a description of it. This is the first time the history of any Indian species of *Mutilla* has been recorded. Black; the abdomen ferruginous, the basal and apical segments black. Head thickly covered with silvery hair; the antennal tubercles rufous; the antennal keel sharply projecting. Clypeus covered with long white hair; its apex smooth, rounded. Mandibles broadly rufous before the apex. Palpi black. Pro- and meso-notum closely and coarsely punctured; the pronotum with a broad band of depressed silvery pubescence; the mesonotal furrows are distinct. Scutellum roundly convex, distinctly raised over the meso-notum; rugosely punctured; there is a short, deep, almost smooth, furrow in the middle behind. Median segment closely and regularly reticulated; the base is covered with depressed white pubescence; the central area is widely expanded at the base; its apex is not much wider than the other reticulations. The base of the meso-pleuræ is rugosely punctured; the rest smooth, except for some striations in the middle. Meso-pleuræ coarsely, rugosely punctured. The upper part of the meta-pleuræ is irregularly reticulated; the lower bears deep round punctures. Legs covered with long white hair; the spurs white; the

tarsal spines with a more rufous tinge. Abdomen ferruginous, the petiole and the apical segment black. The petiole covered with long white hairs; the other segments with ferruginous, except the last, which has blackish hair; the ventral keel has a slight curve, and at the apex projects into a short, triangular tooth; the hypopygium has the sides keeled to near the base; the keel is narrow, straight and curved inwardly at the apex. Wings smoky, with a slight, but distinct, violaceous tinge; the first cubital cellule at the top is not half the length of the second; the second transverse cubital nervure is roundly curved above the middle.

SCOLIIDÆ.

MYZINE APIMACULA, *sp. nov.*

Nigra, flagello antennarum tarsisque rufo-testaceis; abdominis apice late rufo; alis hyalinis, nervis pallidis. ♀

Length.—9 mm.

Habitat.—Deesa.

Antennæ rufo-testaceous; the scape, except at the apex, black; the scape, with a few hairs, smooth and shining; the basal joints of the flagellum obliquely and gradually narrowed from the apex to the base. Clypeus rufous, strongly punctured, except at the base. Mandibles rufous, the apex black. Pro-and meso-thorax shining; the pro-finely and somewhat closely punctured; the meso-notum is impunctate at the base; the rest of it with minute, scattered punctures. Scutellum sparsely punctured on the sides and on the basal half; the post-scutellum is minutely punctured. Median segment closely and rather strongly aciculated; the apical slope bears also some minute punctures, and is thickly covered with white pubescence. Pro-pleuræ with scattered punctures; the apex closely, rugosely aciculated; the meso- punctured, except at the apex; the meta- closely, obliquely striated. Legs black; the greater part of the tibiæ and the tarsi rufous; the tibiæ and tarsi are thickly covered with white hair. Wings clear hyaline; the radial cellule of a faint fuscous colour; the stigma and nervures pale testaceous. Abdomen black; the back from the apex of the third segment and the ventral side from the apex of the second, red; it is sparsely covered with long white hair and minutely, but not closely, punctured; there is a closely striated band behind the apex of the pygidium.

A species easily known by the red apex of the abdomen. It is one of the smaller species.

POECILOTIPHIA, *gen. nov.*

♂ Forewings with two transverse cubital nervures which enclose a long cellule in the middle, this cellule receiving both the recurrent nervures. Radial cellule closed at the apex; the transverse basal nervure is interstitial; the discoidal cellules are large; in the hind wings the radial, cubital and discoidal nervures are continued to the edge of the wings and not abbreviated as in *Tiphia*. Mandibles bidentate, the lower tooth much larger than the upper. Pro-thorax large, transverse at the base. Legs thickly pilose; the middle with two spurs on the tibia; the claws simple, eyes large, sinuate on the inner side. Basal abdominal segment with a short, but distinct, peduncle at the base; the dilated part rounded on the sides, narrowed at the base and apex; the second segment distinctly narrowed at the base, becoming gradually wider towards the apex. The last abdominal segment is large, widely, roundly and deeply incised at the apex, the sides forming sharp teeth, between which the long curved anal spine projects.

The antennæ are stout; the apex of the clypeus is broadly rounded; the occiput is transverse and is margined; the scutellum is flat; the median segment bulges out roundly in the middle; the second and third abdominal segments are constricted at the base and apex; they are punctured and covered with stiff hair as in *Tiphia*; the legs are short, slender and thickly covered with long stiff hairs; the middle pair have two spurs; the median segment is without longitudinal keels; it is transverse at the apex, with the sides bulging out roundly.

The affinities of this genus are clearly with *Tiphia* and *Myzine*; the character of the alar neuration is sufficient to separate it from either; *Myzine* has three transverse cubital nervures, and the recurrent nervures are received in different cellules; its affinities are closer with *Tiphia*, but in it also the recurrent nervures are received in different cellules, which are also differently formed; *Tiphia* differs further in the middle tibiæ having only one spur; the occiput in our genus is transverse not narrowed gradually, it differing also in having a distinct margin; the apical nervures in the hinder wings are more complete, extending to the apex and not abbreviated as they are in *Tiphia* and, to a less extent, in *Myzine*. The white markings on the abdomen remind one of *Thynnus*.

POECILOTIPHIA ALBOMACULATA, *sp. nov.* (Pl. fig. 6.)

Nigra, flagello antennarum, abdominisque apice rufis, abdomine albomaculato; lineis pronoti, apice clypei tarsisque albis; alis hyalinis, stigmate fusco; nervis pallidis. ♂

Length.—8—9 mm.

Habitat.—Deesa.

Antennæ rufous, the scape black; the apical joints slightly dilated on the under-side; the scape punctured and covered with white hair. Head black; the apex of the clypeus white; the front rather strongly, the vertex more finely, punctured; the antennal tubercles smooth. Clypeus closely punctured, bounded above laterally by oblique, deep furrows. In front of the foreocellus is a deep pit; the hair is long and white. Mandibles rufous. Thorax black, punctured, covered with longish white hair; the hinder border of the pro-notum and a spot on either side at the base, white. Median segment closely, rugosely punctured; the meta-notum in the middle closely, transversely striated; the striæ are curved upwards. Pro- and meso-pleuræ shining, sparsely punctured; the lower part of the meta-pleuræ sparsely punctured, shining. Legs black; the knees, the fore-tibiæ in front and the tarsi white; the hair is long, stiff and white. Abdomen black; the apex of the fifth and its middle more broadly and the whole of the sixth and seventh segments rufous; a line on the middle of the basal five segments at the apex and a mark on either side of it and a small mark on the apex of the sixth, white. The petiole is smooth and shining, as is also the base of the second and the basal half of the third and fourth segments, the smooth and punctured portions being distinctly separated; the rest of the segments and the apical ones entirely punctured, strongly, but not very closely, and covered with longish, white hair; the spine is long, curved, stout and rufous. The ventral segments are fringed with white hair, and are strongly punctured. Wings clear hyaline; the stigma and costa fuscous, the nervures paler; the radius is oblique, and straight at the base; the apical abscissa is curved; the first transverse cubital nervure is elbowed shortly below the middle; the second is roundly curved; the recurrent nervures are received about the same distance from the base and apex of the cellule.

MEIRA QUADRIMACULATA, *sp. nov.* (Pl. fig. 5 ♀)

Nigra, ore, mandibulis, abdomine tarsisque rufis; abdomine quadri-albomaculato; alis hyalinis, nervis fuscis. ♀

Length.—8—9 mm.

Habitat.—Deesa.

Antennæ black; the apex of the scape and the base of the flagellum rufous; the under-side of the scape and the base of the flagellum bearing a few long white hairs. Head black, shining, bare; the antennal tubercles and the apex of the clypeus rufous; the apex of the clypeus transverse; its sides straight; it is sparsely punctured. On the base of the mandibles are some long, pale, fulvous hairs; the apex blackish. Thorax black, smooth and shining; the base of the pro-notum and the pleuræ are sparsely covered with long, soft, white hair; the base of the pro-notum is sparsely punctured; the apex is piceous; on the sides of the scutellum are four punctures; the base of the median segment is indistinctly furrowed. The base of the pro-pleuræ bears some minute punctures; its apex and the meso-pleuræ are strongly, but not very closely, punctured; the upper part of the meta-pleuræ closely, obliquely and minutely striated. Wings hyaline; the stigma black; the nervures testaceous. Legs black; thickly covered with longish white hairs; the tibiæ and tarsi dark rufo-testaceous; the tibiæ darker behind. Abdomen ferruginous, smooth and shining; the basal segment except at the apex, the second segment at the base laterally, and the base of the third laterally to a less extent, black; in front of the black marks is an irregular, oblique, white mark.

Meira has not been hitherto recorded from the Oriental Zoological Region. It is allied to *Tiphia* and *Scolia*, and is easily known by the peculiar neuration of the fore-wings; the second cubital cellule is largely appendiculated; the first transverse cubital nervure is oblique, and bears the minute cubital cellule on its lower end near to the cubitus†; the radial cellule is open in the ♀, closed in the ♂; the third cubital cellule is very large, being as long as the radial.

NURSEA, *gen. nov.*

Wings with two cubital cellules; the first recurrent nervure received in the first, the second in the second cellule; the former at a considerable distance from the transverse cubital nervure, the second close to it. Antennæ becoming gradually thicker towards the apex; the last joint large, twice the length of the preceding. Head distinctly narrowed behind the eyes; the occiput is sharply keeled. The antennæ

† In the figure this little cellule is not shown.

are placed immediately over the clypeus, which is roundly convex and is rounded at the apex ; the apex itself being depressed. Mandibles longish, curved, unidentate. Ocelli large, placed in a triangle. Prothorax reaching to the tegulæ. Scutellum flat, a striated depression at its base ; its sides keeled. Post-scutellum striated. Median segment large, striated ; the sides toothed. Legs short, not elongated as in the *Pompilidæ* ; the middle tibiæ with two spurs ; they are not spined ; the tarsi spined at the apices of the joints ; the fore-tarsi are longer than the others and incised at the base. Abdomen broad at the base ; the last segment keeled down the sides and covered with a soft, depressed pubescence.

The second joint of the antennæ is larger than usual ; the middle coxæ are widely separated ; the sternum in front of them is raised ; the raised part has a broad, raised, rounded border on the outer-side ; the hinder coxæ are large and are closed together ; the second abdominal segment is large, and below is separated from the first by a deep depression ; the basal ventral segment has the sides keeled ; the middle is stoutly keeled, and from the middle keel others branch off to the apex.

The fact of this genus having the pro-notum largely developed behind and reaching to the tegulæ separates it from the *Sphegidæ*. In the latter respect it agrees with the *Pompilidæ*, from which it differs in some important points :—in the second cubital cellule, receiving only one of the recurrent nervures ; whereas in the *Pompilidæ*, when there are two cubital cellules, both the recurrent nervures are received in the second ; the antennæ are shorter, thicker towards the apex and not curled at the apex ; the scutellum is flatter and keeled ; the median segment is striated ; the legs are shorter, the hinder pair not being lengthened, and there is a distinct pygidium, bordered laterally and covered with pubescence, and the middle coxæ are not continuous, but widely separated—feature not found with any known *Pompilid*. The form of the median segment—in its being longitudinally striated and toothed laterally—reminds one of *Dolichurus*, but that is a typical sphegid.

NURSEA CARINATA, *sp. nov.* (Pl. fig. 4.)

Niger, nitidus, femoribus postecis rufis ; alis hyalinis, stigmate testaceo, nervis fuscis. ♀

Length.—6 mm.

Habitat.—Simla.

Antennæ black, distinctly thickened towards the apex ; the flagellum thickly covered with a microscopic white down ; the scape with the pubescence longer. Head above the antennæ smooth, shining, bearing a microscopic down and having a plumbeous hue ; the clypeus is shagreened, more shining in the middle than on the sides. Pro- and meso-thorax smooth and shining, and covered with a white down which is thicker and more distinct on the pleuræ. The depression at the base of the scutellum is finely, transversely striated at the base; the apical half is longitudinally striated. Scutellum flat, bare, except for a few longish hairs ; the post-scutellum bears about ten, irregular, longitudinal keels. The basal third of the median segment is striated all over; in the middle of the remainder are three longitudinal keels; outside these on the middle part is a shorter keel; on the sides are two keels with a shorter one in the middle at the base ; on the sides of the apical slope there is only one keel which ends in a short tooth ; the apical slope is more thickly covered with white pubescence than the rest. Pleuræ smooth and shining; the sternum is widely furrowed in the middle. Legs black ; the hinder femora red. Wings clear hyaline ; the stigma is testaceous ; the nervures dark fuscous. Abdomen smooth, shining and thickly covered with pale pubescence.

POMPILDÆ.

POMPILUS HERACLIDES, *sp. nov.* (Pl. fig. 3.)

Ferrugineo, abdomine late flavo-balteato ; pedibus rufis ; alis fere flavo-hyalinis, apice fumato. ♀

Length.—9 mm.

Habitat.—Deesa.

Antennæ rufo-fulvous, paler, more yellowish on the under-side ; bare. Head wider than the thorax; transverse behind, bluntly rounded in front. On the head the inner orbits to near the lower ocelli and the sides of the clypeus more broadly and the outer orbits narrowly yellow ; the yellow line on the outer side extending downwards to the mandibles and above across the occiput. Clypeus slightly projecting ; the middle transverse, the sides broadly rounded. Mandibles rufous, black towards the apex. The eyes converge distinctly on the top ; the hinder ocelli are separated from each other by a distinctly greater distance than they are from the eyes. Thorax ferrugineous, covered with a white down ; the apex of the pro-notum is broadly rounded. The median segment has a gradually rounded slope from the base to

the apex. Wings yellowish-hyaline; the yellow tint not very pronounced; there is a fuscous cloud on the apex, commencing at the end of the radial cellule, but not extending backwards to the third transverse cubital nervure; the third cellule is rather narrow, being at the top and bottom about half the length of the second; the first recurrent nervure is received near the base of the apical third, the second at the base of the apical fourth, of the cellule; the basal nervure is interstitial. In the hind wings the anal nervure is roundly and broadly curved at the apex and is received shortly beyond the cubital. Legs coloured like the body; the tarsi paler, more yellowish in tint; the tibiæ and tarsi have long, stout spines; the front tarsi are fringed on the outer side with long, stiff spines. Abdomen coloured like the body, but with the third and fourth segments lemon-yellow, except at the apex.

This species appears to agree closely in colouration with *P. infestus*, Bingham; that is a much larger species (15 mm.); the anterior tarsi are only feebly ciliated on the outer-side; the median segment has a steep slope on the apex, &c.

POMPILUS DEESÆ, *sp. nov.*

Long: 7-8 m.m. ♀.

HABITAT: Deesa.

This species comes close to *P. vivax*, Cam.; it is a shorter and stouter insect; it is much more densely and closely pruinose; the head does not project so much in front of the eyes; the apex of the pronotum is transverse, not angled in the middle; the radial cellule is narrower and the transverse median nervure is not interstitial, but is received distinctly beyond the transverse basal.

Antennæ short and stout. Head distinctly wider than the thorax, densely covered with silvery pubescence. Eyes almost parallel; the hinder ocelli are separated from each other by about the same distance as they are from the eyes; the head is rounded in front, transverse behind. Mandibles broadly rufous in the middle. Pronotum not quite so long as the head, it is transverse behind. The apex of the median segment has a steep, very slightly oblique, slope; its sides rounded, but not broadly. Wings fuscous-hyaline at the base; the apex from shortly behind the base of the radial cellule fuscous, much darker coloured than the base; there is no trace of a yellow tint. Radial cellule short and wide; the apical abscissa straight, oblique; the second cubital cellule is very narrow and is gradually narrowed from the bottom to the top, where

the nervures unite; at the bottom it is slightly less in width than the space bounded by the first recurrent and the second transverse cubital nervures; the first recurrent nervure is received shortly beyond, the second behind, the middle of the cellules. The transverse median nervure is received beyond the transverse basal; the anal nervure is received behind the cubital. Legs black; the spines and calcaria black; the spines on the front tarsi are longer than usual.

POMPILUS CARYATIS, *sp. nov.*

Niger, abdominis basi rufo; alis fusco-violaceis; cellula cubitali 2ª fere longiore quam 1ª. ♀ et ♂.

Long: 8 m.m.

HABITAT: Simla.

Antennæ rather stout, about half the length of the body, almost bare. Head large, if anything, wider than the thorax; the sides of the front and the clypeus covered with silvery pubescence; it is well developed behind, the part there being as long as the space between the hinder ocelli and the eyes. The hinder ocelli are separated from the eyes by a distinctly greater distance than they are from each other. The eyes are large and converge above; they are there separated by the length of the second and third antennal joints united. The front and vertex are covered sparsely with long fuscous hair. The pronotum is shorter than the head; in the centre of the median segment is a distinct fovea, deep and broader than long. Wings fuscous-violaceous. The apex from the second transverse cubital nervure smoky; the third cubital cellule is, if anything, longer on the top than the second; the transverse median nervure is received distinctly on the outer side of the transverse basal; the second and third transverse cubital nervures are roundly curved, with a slightly oblique slope above; the radial cellule is wide and is shorter than the second and third cubital cellules united; in the hind wings the anal nervure is received behind the cubital—not interstitial. Legs stout; the spines large and black as are also the calcaria. Abdomen short and stout, black; the petiole, except at the base, the second segment entirely and more or less of the base of the third, red.

The ♂ is similarly coloured to the ♀; its antennæ are short and thick. If anything, its wings are lighter coloured, not quite so violaceous as in the ♀. The first recurrent nervure is received distinctly beyond, the second more shortly in front of the middle of the cellules,

POMPILUS ALCACUS, *sp. nov.*

Niger, abdominis basi late, tibiis femoribusque posterioribus rufis; alis hyalinis, apice fumatis. ♀

Long: 6-7 m. m.

HABITAT: Deesa.

Front and vertex shining, aciculated, almost bare; the face and clypeus densely covered with silvery pubescence; the apex of clypeus broadly transverse. Mandibles broadly rufous at the base. Antennæ short and thick. Thorax densely pruinose which gives it a white appearance. The pronotum is fully longer than the head. The median segment is more densely pruinose than the rest of the thorax; it has no longitudinal furrow. Abdomen smooth and shining; the basal three segments are entirely ferruginous. Wings hyaline, fuscous from the apex of the radial cellule. Radial cellule short and wide; there are three curves in the radius; the apical one being the larger and is itself slightly obliquely curved towards the apex; the second cubital cellule is large, the third small, narrow; at the top hardly one-fourth of the upper side of the second; it is narrowed at the top; the first recurrent nervure is received shortly beyond the apex of the basal third of the cellule; the second is almost united with the second transverse cubital. The transverse median nervure is received beyond the transverse basal, clearly separated from it. In the hind wings the apical nervures are faint, almost obliterated; the anal cellule is appendiculated.

Comes nearest, through its general colouration and alar neuration, to *P. zeus*, Cam. That species is larger (8-9 m. m.); the apical abscissa of the radius is rounded and is broadly curved downwards, the apex of the cellule thus not being acutely pointed and the median nervure is interstitial.

POMPILUS (PLANICEPS) CAROLI, *sp. nov.*

Niger, dense pruinoso; alis hyalinis, apice fumatis. ♀.

Long: 7-8 m. m.

HABITAT: Deesa.

The entire body densely covered with a silvery pile, which gives it a greyish appearance. Antennæ short; the scape covered with silvery pubescence. Head transverse behind; the eyes reach to the hinder edge; in front it is slightly rounded; the ocelli are in a curve (∴), not forming a triangle; the hinder are separated from each other by a slightly greater distance than they are from the eyes. Clypeus broadly

convex; its apex in the middle transverse and with a distinct depressed margin. The pronotum is shortly, but distinctly, longer than the head; the median segment has a gradually rounded slope. The mandibles are broadly rufous at the base. Legs long; the hinder tarsi and spurs have a brownish hue; the spines are stout. Wings clear hyaline; the apex from near the end of the radial cellule is smoky; the middle (second) cubital cellule is on the lower side longer than the others; the first recurrent nervure is received opposite the end of the first abscissa of the radius; the second at a less distance from the end. The anal nervure in the hind wings is almost, if not quite, interstitial, as is also the transverse basal.

POMPILUS (PLANICEPS) HALYS, *sp. nov.*

Long: fere 6 m. m. ♂.

HABITAT: Deesa.

This species agrees closely with *P. caroli* here described, but may be readily separated from it by the difference in the alar neuration; its radial cellule is distinctly shorter and does not reach half way between the end of the stigma and the apex of the wing, whereas in *caroli* it is distinctly longer, it extending beyond the middle; the middle cubital cellule is also much shorter, it being not half the length of the apical, whereas in *caroli* it is longer than it.

Antennæ short and thick, the joints clearly separated, the apical slightly dilated on the underside. Eyes slightly converging below, the hinder ocelli are separated from each other by a distinctly greater distance than they are from the eyes. Clypeus broadly convex; its apex transverse, the sides oblique. Occiput transverse. Pronotum slightly larger than the head. Legs black, the spines long and black. Wings hyaline, smoky from near the second transverse cubital nervure. Radial cellule short, scarcely longer than the middle cellule, its apex acutely pointed; the middle cellule is about one-half the length of the apical; the recurrent nervures are received about the same distance from the base and apex; the transverse median nervure is received on the outer side of the transverse basal and clearly separately from it; the anal nervure in the hind wings is received behind the cubital. The entire body is densely pruinose.

POMPILUS (PLANICEPS) SIMLAENSIS, *sp. nov.*

Long: 6 m. m. ♂.

HABITAT: Simla.

This species is very closely related to *P. caroli* and *P. halys*, having like them the wings clouded towards the apex; but the apical cloud is not so deeply tinted; it is broader, and it extends near to the first transverse cubital nervure; the middle cubital cellule is much shorter than it is in *caroli*; from *halys* it may be known by the longer and narrower radial cellule.

Head transverse behind, rounded in front; smooth and shining; it hardly projects beyond the middle behind; the eyes are parallel and hardly converge below; the hinder ocelli are separated from each other by a distinctly greater distance than they are from the eyes. The apex of the clypeus is transverse in the middle at the apex; it is rather flat, not convex to any extent. Mandibles broadly rufous in the middle. The radial and cubital cellules are smoky, but not deeply; the cloud also extending below the cubitus; in the cubital cellules the cloud is divided in two by a narrow hyaline band placed beyond the second transverse cubital nervure. Radial cellule elongate, lanceolate at the apex; it is distinctly longer than the middle cubital cellule, which is somewhat shorter than the apical abscissa of the cubitus; the basal nervure is roundly curved; the transverse medium is about interstitial. In the hind wings the anal nervure is received behind the cubital. The antennæ are stout; their middle and apical joints are distinctly and roundly dilated on the lower side.

POMPILUS (PLANICEPS) INDOSTANUS, *sp. nov.*

Niger, pruinoso; alis clare hyalinis. ♀.

Long: .7 m. m.

HABITAT: Deesa.

Antennæ as long as the abdomen; covered with a pale pile. Head rounded in front, behind not quite transverse, being slightly rounded inwardly. The eyes slightly converge above and reach close to the base of the mandibles; the head behind them is fairly well developed, being there about two-thirds of the width of the eyes; the hinder ocelli are separated from each other by a distinctly greater distance than they are from the eyes. The prothorax is not much longer than the head. The spines on the legs are long and black. Wings clear hyaline; the radial cellule is elongate, narrow, sharply lanceolate at the apex; the middle cubital cellule is distinctly longer than it, the transverse basal nervure is interstitial; in the hind wings the anal nervure is received distinctly behind the cubital.

Easily known by the clear hyaline wings.

APORUS EXCRUCIANS, *sp. nov.*

Niger, abdominis basi late rufo; alis fere hyalinis, apice fusco. ♂.

Long: 6 m.m.

HABITAT: Simla.

Head aluteaceous, opaque; the face covered with silvery pubescence; the ocelli hardly form a triangle; the hinder pair are separated from the eyes by a slightly greater distance than they are from each other. The eyes converge very slightly towards the bottom; there is a slight curve on the inner side above. Mandibles rufous, black at the base. Thorax opaque, covered with a pale pubescence. Legs long, black, with a pale pubescence; the spines and calcaria are black. Wings fuscous-hyaline, with a slight, but distinct, cloud on the apex, from the end of the radial cellule. Radial cellule small; the apical two-thirds obliquely narrowed; the second cubital cellule is about the length of the radial; it is about as wide as long, rounded at the top; the cubital nervures there are separated by slightly less than the space bounded by the first transverse cubital and the first recurrent nervures, which is received near the apex of the apical fourth of the cellule; the second at a less distance from the apex. The anal cellule in the hind wings is short, its apex not reaching to the middle, the second has a rounded curve; the recurrent nervures are received near the middle of the cellules; the transverse basal nervure is received distinctly in front of the transverse basal. In the hind wings the anal nervure is interstitial or nearly so. On the abdomen, the basal, the second and the base of the third segment are red.

SPHEGIDÆ.

NOTOGONIA PULCHERRIMA, *sp. nov.* (Pl. fig. 7. 7*a*.)

Nigra, abdominis basi late, apice pedibusque rufis; alis flavo-hyalinis, apice fumatis. ♀.

Long: 17 m.m.

HABITAT: Deesa.

Antennæ covered with silvery pubescence; black. The scape red. Head black; the apex of the clypeus dull-red; the front and clypeus covered with depressed silvery pubescence; the lower part of the vertex is sparsely pilose. Mandibles broadly rufous in the middle; the base is covered with silvery pubescence; the apical joints of the palpi are dark-rufous. Thorax covered with a silvery pile, which has a more golden hue on the mesonotum. The median segment is transverse; the

metapleuræ obliquely closely striated. Wings yellowish-hyaline; fuscous from the base of the radial cellule. Legs red; the anterior coxæ and trochanters, the greater part of the middle coxæ and the base of the posterior coxæ, black; the spurs and spines on the front legs are dark-rufous; on the four posterior legs they are black. The basal two segments of the abdomen and the last segment are red; the segments are bordered with silvery pubescence, the pile on the pygidium is silvery.

The ♂ is similarly coloured, except that the scape is black. A distinct and handsome species.

GASTROSERICUS RUFITARSIS, *sp. nov.*

Niger, dense albo piloso, basi abdominis, geniculis tarsisque rufis; alis hyalinis, coste stigmateque testaceis, nervis fuscis. ♀.

Long.: 9 m.m.

HABITAT: Deesa.

Antennæ black, thickly covered with silvery pubescence; the apex of the scape pale-yellow. Head black; the front thickly covered with longish grey hair; the cheeks and clypeus with longish, depressed bright-silvery pubescence; the vertex is sparsely haired; the ocellar region is closely and distinctly punctured; behind with an oblique slope, and smooth and shining; the vertex minutely, but not very closely, punctured; it is obliquely depressed towards the centre, where there is a narrow longitudinal furrow. Mandibles pallid yellow at the base, where they are covered with depressed silvery pubescence; the apex black, rufous behind. Thorax thickly covered with white pubescence, it is longest and thickest on the apical slope of the median segment; the mesonotum and scutellum closely and distinctly punctured; the median segment rugose. Wings clear hyaline, with a steelly iridescence; the costa and stigma are rufo-testaceous, the nervures darker; the radial cellule is short, its apical abscissa is straight and has a slightly oblique slope; the lower abscissa projects beyond it as a short stump; the cubital cellule is much narrowed on the top; the recurrent nervures are united and are received near the basal fourth of the cellule. Legs thickly covered with silvery pubescence; all the tarsi and the base and apex of the tibiæ are rufous; the tibial and tarsal spines are pale. Abdomen black; the basal segment and the second, except at the apex, rufous; the apex of the segments marked with bright silvery pubescence; the pygidium is covered with depressed silvery pubescence.

A species closely related to *G. wroughtoni*, but distinctly smaller and more slenderly built. The differences between them may be expressed thus—

Length—11 m.m.

The tarsi for the greater part black; the upper part of the second transverse cubital nervure is straight and makes an elbow below with the larger lower portion; the lower part of the second recurrent nervure broadly rounded.—*Wroughtoni.*

Length—9 m.m.

The tarsi rufous; the upper part of the second transverse cubital not sharply elbowed on its lower end; the lower part *rufitarsis* of the second recurrent nervure.

OXYBELUS AURIFRONS, *sp. nov.*

Niger, flavo-maculato, fronte aureopiloso, pedibus posticis nigris, basi tibiarum tarsisque flavis. ♀.

Long: 5-6 m.m.

HABITAT: Deesa.

Scape of antennæ yellow, lined with black above; the flagellum rufous, the base blackish above. Head black; the front thickly covered with golden pubescence; the vertex closely punctured and covered with silvery pubescence, which does not hide the sculpture. Clypeus broadly projecting in the middle; the sides of the keel with an oblique slope on the sides; the apex has also an oblique, rounded slope above and does not project much. Mandibles more or less rufous, the base broadly yellow. Thorax black; a line on the pronotum, the scutellum, except down the centre and at the apex, the post scutellum with its spines, the tubercles and the tegulae, yellow. Mesonotum closely and strongly punctured; the scutelium is more strongly, but not quite so closely, punctured, and is stoutly keeled down the middle; the post-scutellum is broadly and roundly raised in the middle; the lateral laminæ are roundly curved outwardly; the apex sharp; it becomes gradually wider towards the base on the inner side; the spine is long, curved, of nearly equal width, hollowed above; the apex in the middle triangularly incised. The median segment is irregularly obliquely striated; the striæ are placed at irregular distances; the middle of the segment is hollowed and is free from striæ; its apex is sharply obliquely pointed. Legs black; the underside and apex of the fore femora, their

tibiæ and tarsi, the middle knees, the tibiæ, except broadly above, the base of the hinder tibiæ and the tarsi, yellow. Wings clear hyaline; the nervures and stigma black. Abdomen black, with two large broad marks on each segment.

PSEN CARINIFRONS, *sp. nov.*

Niger, mandibulis, scapo antennarum, linea pronoti, scutello, post-scutello, pedibus anterioribus tibiisque posticis flavis; abdominis medio rufo late maculato; alis hyalinis; nervis stigmateque nigris. ♂.

Long: fere 7 m.m.

HABITAT: Deesa.

Antennæ black, stout; the scape and second joint straw-yellow; the flagellum brownish beneath towards the apex and base. Head black; the vertex smooth, shining; the front minutely and closely punctured; the lower part of the face and the clypeus thickly covered with depressed silvery pubescence; between the antennæ is a stout, projecting keel, which becomes triangularly widened below the antennæ. Mandibles and palpi straw-yellow; the mandiouular teeth black; the palpi yellow. Thorax shining; the edge of the pronotum, the tubercles, scutellum and post-scutellum straw-yellow. Median segment reticulated, broadly furrowed down the middle, the furrow not margined; the base of the segment is smooth; the narrow depression at the base is striated; pro- and meso-pleuræ smooth and shining; the furrows crenulated; the metapleuræ reticulated; the reticulations are closer and more regular than they are on the metanotum. The four front legs are straw-yellow, as are also the hinder tibiæ; the hinder coxæ, except at the apex, the femora, the apex of the tibiæ and of the tarsi, black. Wings clear hyaline; the first and second transverse cubital nervures are parallel and oblique; the first recurrent nervure is interstitial; the second is received shortly beyond the second transverse cubital, almost touching it. Abdomen black; the second segment is rufous to shortly beyond its middle; the petiole is longer than usual, being as long as all the rest of the abdomen united in the ♂; it is largely nodose at the apex.

This species is easily known by the presence of a pointed plate between the antennæ. The only species known, similarly armed, is *P. annulipes*, Cam., from Central America, for which Kohl. (Ann. d. k. k. Hof. Mus. Wien, 1896, p. 292) formed a distinct section of the genus. Apart from this structural peculiarity it differs from the other

species in having the median segment more regularly reticulated; the "enclosed area" at its base is not of a triangular form and extends to the sides, while in the other species it is confined to the centre and is more regularly bordered by furrows; the segment itself is larger compared to the rest of the thorax; the petiole is longer than usual and is more distinctly dilated at the apex. In the hind wings the apical nervures are obliterated; the transverse anal nervure is received behind the cubital, the discoidal nervure being obliterated entirely. In the fore-wings the transverse basal nervure is received shortly behind the transverse basal.

PSEN RETICULATUS, *sp. nov.*

Niger, nitidus, capite thoraceque dense albo pilosis; alis hyalinis, nervis stigmatique nigris. ♀ et ♂.

Long: 10-11 m.m.

HABITAT: Deesa.

Scape of antennæ bearing white hairs; the flagellum densely covered with white pubescence. Front and vertex smooth and shining; covered with longish white hair; the face and clypeus densely covered with silvery pubescence, which is more dense on the face than on the clypeus. The clypeus is broadly roundly convex; its apex broadly projects in the middle; the projecting part has a broad, shallow incision; its sides are oblique. Thorax smooth and shining; the basal area of the median segment is stoutly longitudinally keeled, except in the middle, where there is a wide shallow furrow, which is bordered by keels, becomes wider gradually towards the apex and bears a few transverse keels at the base; in the middle are a few stouter keels, from which the furrow is continued to the apex of the segment; on the apical slope is, on either side of this furrow, a large shallow somewhat semicircular furrow, bordered on the inner side by a stout keel; from the centre of this area two stout keels run to the sides, these being divided by an irregular curved one in the centre. The basal furrow on the mesopleuræ is crenulated, the longitudinal one is smooth and narrower. The apex of the metapleuræ is bordered by a keel, beyond which is another more irregular one, the two enclosing between them the stigma, below which are three or four stout keels. Wings clear hyaline; the second recurrent nervure is interstitial. Legs covered with long soft white hair; the spurs are pale. Abdomen smooth and shining; the long-curved petiole is covered with long white, soft hairs.

Comes nearest to *P. orientalis*, Cam.; is easily separated from it by the different form of the median segment; in it the enclosed space is finely, not stoutly, longitudinally striated, and the apical slope of the segment is not broadly and deeply furrowed. The black on the thorax has a plumbeous hue; the pygidial area is clearly defined; it is smooth and shining at the base; the apex is opaque and has some irregular punctures on the sides. The striæ on the median segment give it a reticulated appearance, especially on the sides.

ALYSON TESTACEITARSIS, *sp. nov.*

Niger, nitidis, scapo antennarum, mandibulis orbitisque oculorum infra albis; alis hyalinis, fusco-bifasciatis. ♀.

Long: 6 m.m.

HABITAT: Simla.

Antennæ black; the scape pale-yellow beneath. Head black; a line on the inner orbits reaching from shortly above the middle to shortly below the base of the antennæ, a mark on either side of the middle of the clypeus and the mandibles, except the teeth, pale-yellow. Thorax entirely black, covered with short pale pubescence; the median segment irregularly, transversely and obliquely striated; the central area is elongate; it bears two keels in the centre at the base, which reach to beyond the middle and diverge outwardly at the apex; the space between and on either side of them is smooth; from its apex a stout keel runs down to the end of the segment. The base of the pronotum is depressed and clearly separated from the larger raised apical part. Pleuræ smooth and shining; the upper part of the mesopleuræ is raised; on the sides, at the top of the apical slope of the median segment, is a short, stout tooth. Wings hyaline, the nervures and stigma blackish; the latter pale at the base; there is a fuscous cloud along the outer side of the transverse basal nervure and a broader oblique one occupying the radial cellule, except its apex, and extending through the cubital cellules to the posterior border. Legs black; the anterior coxæ in front, the greater part of the front trochanters, the base of the fore femora and the whole of the front tarsi, pale-testaceous; the four hinder tarsi are of a darker testaceous colour. Abdomen smooth and shining; the two spots white; the pygidium is covered with depressed silvery pubescence and with some longish hair; its edges are testaceous. The head and thorax are covered with silvery pubescence; the apex of the abdomen and the ventral segment sparsely with long silvery hair.

Allied to *A. annulipes*, Cam., which, *inter alia*, differs in having the apical slope of the median segment areolated.

ALYSON ERYTHROTHORAX, *sp. nov.*

Niger, thorace rufo; scapo antennarum subtus, clypeo, mandibulis, lineaque orbitis oculorum flavis; pedibus nigris, tibiis anterioribus anticiss basique tibiarum posticarum albis; alis hyalinis, apice fumatis. ♀.

Long: 4 m.m.

HABITAT: Simla.

Antennæ black; the scape yellow below. Head thickly covered with silvery pubescence; the front closely and distinctly punctured; the lower half of the inner orbits, the clypeus and the mandibles, yellow; the apices of the mandibles piceous. Thorax rufous; the lower part of the mesopleuræ and the breast black: it is thickly covered with white pubescence; the propleuræ striated in the middle; the mesonotum closely and distinctly punctured; the scutellum more obscurely punctured. Median segment rather strongly and irregularly transversely striated; the central area is rounded at the apex; the apical slope is oblique; its central keel is stout; shortly below its middle is a transverse one, and below this is another shorter transverse keel. Legs black; the apices of the four anterior coxæ, the apex of their trochanters, the four anterior tibiæ in front, and the base of the hinder tibiæ, white; the tarsi testaceous. Wings hyaline; the apex from the middle of the stigma smoky; the transverse cubital nervures are interstitial. Abdomen smooth and shining.

Allied to *Alyson ruficolle*, which may be known from it by the two keels on the median segment being not united at the apex; the propleuræ are not striated; the hair on the front and vertex is black and the wings have not a distinct cloud on the apex.

VESPIDÆ.

ZETHUS INTERSTITIALIS, *sp. nov.*

Niger, sparse flavo maculato, dense albo piloso; alis hyalinis, antice fumato; tegulis rufis; cellula cubitali 2ª appendiculata. ♀.

Long: 10 m.m.

HABITAT: Matheran, in March.

Antennæ black; the scape marked with yellow towards the apex; the flagellum rufous beneath at the apex. Clypeus sparsely punctured and covered with a microscopic down; on its top is an irregular

yellow mark which is broader than long; the apex is narrowed in the middle and is broadly, but not deeply, incised. The front and vertex are strongly and closely punctured and covered with silvery pubescence. Mandibles smooth and shining; keeled along the inner and outer sides above. Thorax closely, uniformly and rather strongly punctured; the median segment more closely, and not quite so distinctly as the mesothorax. Shortly behind the apex of the middle of the scutellum are two curved yellow marks; in front of it, on the mesonotum, is a short, longitudinal furrow. Legs black; the apex of the four anterior femora, and the four anterior tibiæ, except behind, yellow. Wings hyaline; the costal and the radial cellule for the greater part smoky; the second cubital cellule is narrowed at the top, the two transverse cubital nervures being united there; the third cellule is widest at the top; the cubitus does not extend beyond it. The petiole is as long as the rest of the abdomen united; it is not much widened towards the apex; above it is irregularly punctured; the sides are rufous except at the base and apex; its apex and the apex of the second segment yellow. The second segment is bell-shaped, roundly narrowed at the base, the apex transverse.

The pronotum above is transverse; its edges project sharply; in addition to two short central furrows on the apex of the mesonotum there is a somewhat longer curved one on either side of them; there is no groove or keel on the median segment, the apex of which is roundly incised, the sides projecting into bluntly rounded yellowish teeth; its apex has a perpendicular slope; the base of the petiole is not perceptibly narrowed.

The ♂ has the clypeus yellow except at the apex where it projects into two teeth; the apical joint of the antennæ is short, longer than broad; the spine is longer than it.

The form of the wing cellules is as in *Labus*; the petiole is not narrowed at the base as in typical *Zethus*; the antennæ are placed distinctly above the top of the clypeus; the mandibles have a large, rounded sub-apical tooth, which is clearly separated; they are of moderate length; the scutellum is flat, separated from the mesonotum by a furrow; its apex behind the yellow marks is stoutly, longitudinally striated.

This species cannot be referred to any described species of *Zethus* or *Labus*, with which genus or sub-genus it agrees better than it does with

typical *Zethus*. It differs from *Labus humbertianus*, Saussure, in its post-scutellum not being spined. *L. humbertianus*, Bingham (Fauna of India, Hymen., i., p. 349) is probably a different species from the *humbertianus* of Saussure. At least Col. Bingham in his description makes no mention of the presence of a scutellar spine.

I am inclined to agree with the opinion of Mr. W. J. Fox (Proc. Acad. of Nat. Sc. of Phil., 1899, p. 435) and of Saussure (Synop. of Am. Wasps, p. 56) that there is no valid distinction between *Labus* and *Zethus*.

MEMOIRS ON ORIENTAL RHYNCHOTA.

By G. W. Kirkaldy, F.E.S.

With Plates A, B and C.

(*Continued from page* 58 *of this Volume.*)

Group Eucerocoraria.

= Valdasaria auctt. (11)

Of this group, which is easily recognised by the doubly constricted pro-notum and the acutangular membrane cell, there are three Oriental genera :—

A. Scutellum, with a process arising more or less perpendicularly from the disk. ♂ Pro-notum blackish or brownish; ♀ pro-notum yellowish or reddish.

1. Helopeltis, Sign., type *H. antonii*, Sign.

Aa. Scutellum without a process—
♂ ♀ Similarly coloured.

B. Scutellum strongly sulcate.

2. Platypeltis, Sign., type *P. chinensis*, Sign.

Bb. Scutellum only superficially sulcate, often transversely rugulose.

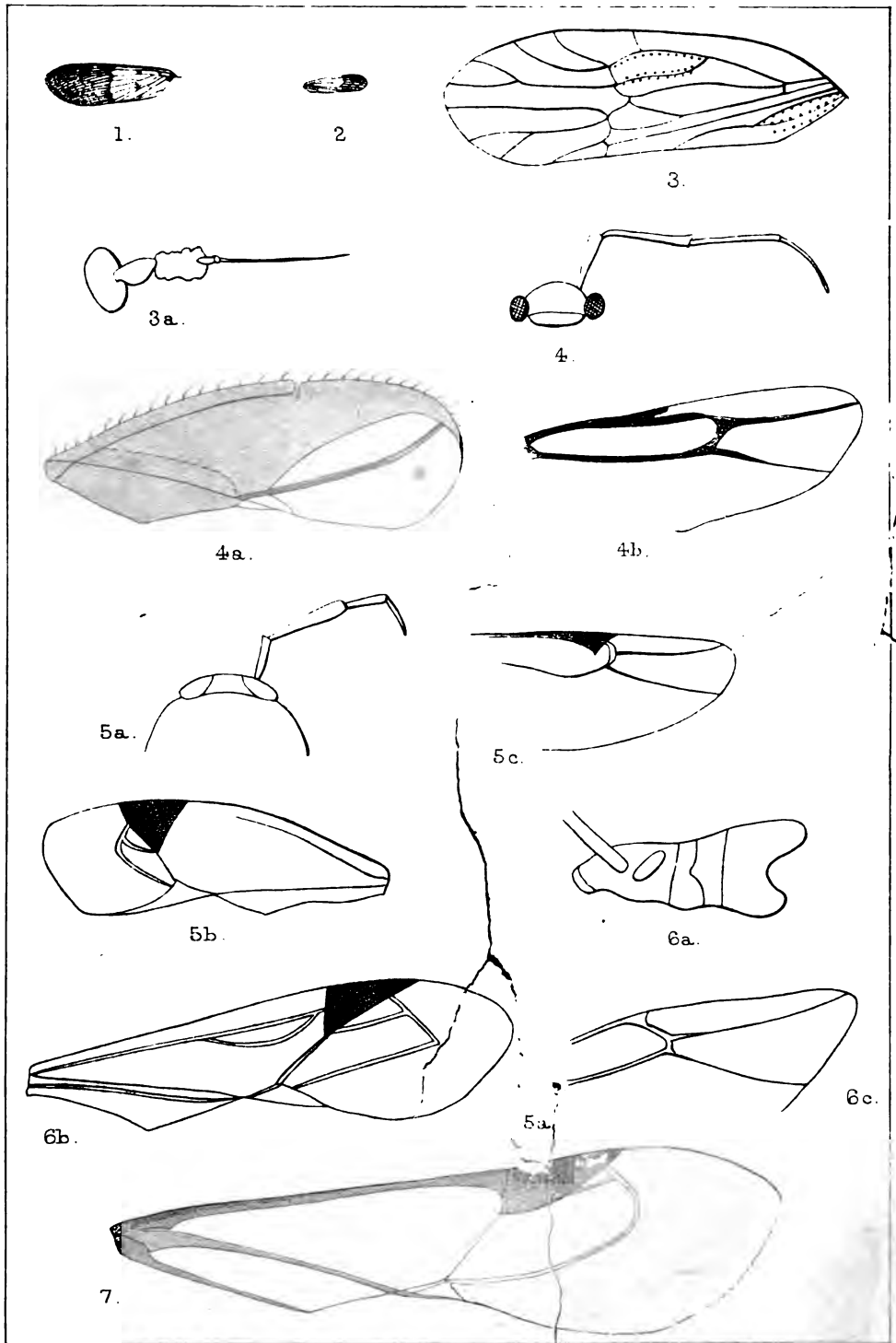
(11) *Eucerocoris*, Westw., 1835, is the oldest genus in the division.

3. Disphinctus, Stål, type *D. sahlbergi*, Stål, Kirk.

Helopeltis has comparatively recently (12) been discussed by Waterhouse and Atkinson, while *Platypeltis* is unknown to me. *Disphinctus humeralis* has been recorded (13) as attacking cinchona in Mungphu in Sikkim. Mr. Green has sent me two species from Ceylon—one from *Mœsa indica* and another closely allied to *D. humeralis* from a number of plants. Walker's three oriental species of *Monalonion* (1873, Cat. Heter. VI, 161—3), were placed by Atkinson (1889, Journ. As. Soc., Beng., LVIII, pt. 2, Suppl., p. 51) in *Disphinctus*, but *M. divisum*, Walk., is certainly not a *Disphinctus*, and does not apparently belong to any described genus; as the unique type, however, is headless, its exact systematic position must remain doubtful.

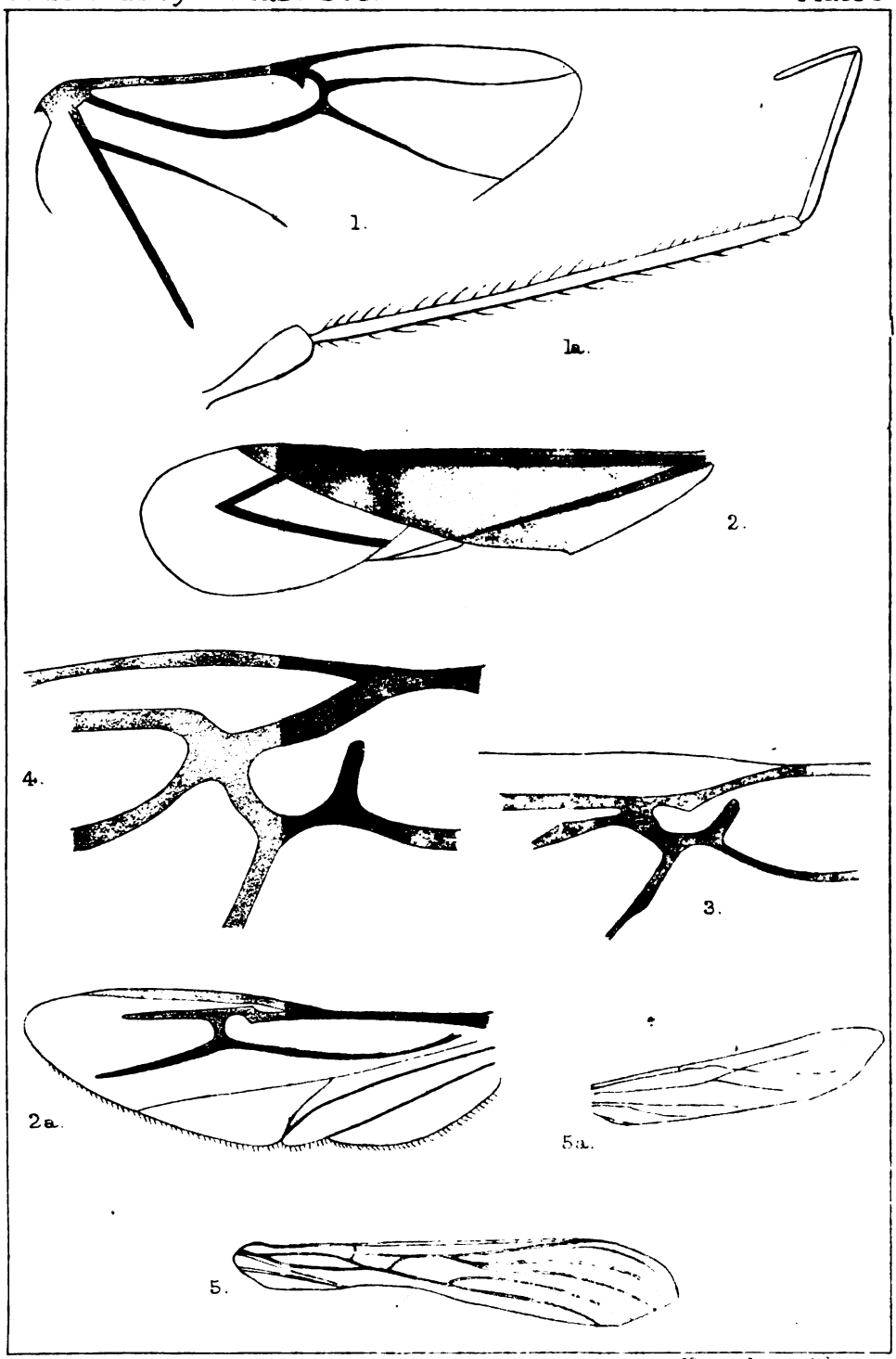
(12) Waterhouse, Trans. Ent. Soc., 1886, pp. 457—60, Plate XI; 1888, p.. 207; and 1894, pp. 31—2.
Atkinson, 1890, Ind. Mus. Notes, I, pp. 175—87, Plate XII, figs. 2—4.

(13) 1889, Ind. Mus. Notes, I, p. 4 (Atkinson, Notes on Indian Insect Pests—Rhynchota).



1&2. J. S. photo. 3-7. G W.K. del.

ORIENTAL RHYNCHOTA



G.W.K. del. Minter Bros. lith. London

ORIENTAL RHYNCHOTA

DISPHINCTUS MÆSARUM, sp. n.

Very hairy; second segment of antennæ four times as long as the first. (14) Pro-notum laterally rounded, subsinuate, furnished with pale yellow hairs.

(14) I regret that I have seen only two examples of this distinct species. Of the mal. the antennæ and elytra are missing,; of the female, the apical two segments of the antennæ.

Head yellowish-brown with a black clouded band at the base; pro-notum blackish-brown, anterior half more or less yellow-red-brown, postero-lateral angles and a wedge-shaped longitudinal median line on the basal half of posterior lobe, flavous. Scutellum flavous, apical margin ("base" auctt. !) and lateral margins, black. Elytra cinereous, basal half of clavus, apical third of corium and apex of cuneus, blackish. Membrane infuscate. Beneath sordid reddish or brownish-flavous; pleura, posterior coxæ, genital segments, &c., black. Antennæ black, except base of first segment. Apical fourth of posterior and intermediate femora and the tarsi, black. Anterior lobes of pro-notum with black hair tufts.

Long. ♂ 6½ mill.; ♀ 8½ mill.

CEYLON: Pundaluoya (E. E. G., Feb. 1899); punctures leaves of *Mæsa indica*.

D. FORMOSUS, sp. n.

Pl. A., fig. 10; and Pl. C., fig. 2.

Second segment of antennæ four times as long as first, which is incrassate; third four-sevenths longer than the second and twice as long as fourth. Elytra very hairy (long, thick, pale hairs). Scutellum transversely striate. Rostrum reaching to the middle of the meso-sternum, which is produced posteriorly in an acute spine. Head, pro-notum and scutellum rufo-testaceous, anterior margin of pro-notum ruddier. Eyes and antennæ (except whitish or brownish basal third of first segment) black. Elytra cinereo-flavous; apical third of corium, apex of cuneus and entire membrane, infuscate. Legs testaceous, rufo-testaceous apically; tarsi blackish. Posterior lobe of pro-notum usually immaculate, but occasionally clouded at the base.

♂ Abdomen slightly constricted longitudinally in the middle, broadened out at base of fourth segment; carinate longitudinally beneath; connexivum subvertical, scarcely extending laterally beyond elytra. Long. 5 mill., lat 1·5 mill.

♀ Connexivum very broad, extending noticeably laterally beyond elytra. Sheath extending to apex of fourth abdominal segment. Long. 5·5 mill., lat 1·6 mill.

CEYLON: Punctures, leaves of *Solanum*, sp. (Peradeniya [Reg. No. 145], March 1900, E. E. Green); punctures, young leaves and shoots of *Peperonia*, sp. (Kandy [Reg. No. 78], Dec. 24, 1899, E. E. G.); punctures, young leaves of common Guava, *Psidium guyava* (Peradeniya [Reg. No. 123], Jan. 1900, E. E. G.); punctures, young leaves of *Acalypha*, sp. (Badulla [Reg. No. 145] Feb. 1900, E. E. G.).

This species is allied to *D. humeralis* (Walk.), but beyond the difference in antennal proportions, the posterior margin of the pro-notum in *D. formosus* is nearly always immaculate, or at least only slightly clouded, while in *D. humeralis* (of which there are a number of specimens in the British Museum) there appear to be always two deep, shining black, small, but very clearly and sharply defined, round spots, one on each side, near the basal margin.

D. DUDGEONI, nom. n.

In the "Indian Museum Notes", 1894, III, No. (5), pp. 33—8, Mr. G. C. Dudgeon published some exceedingly interesting "Notes on the Oviposition of *Helopeltis theivora*, Waterhouse ("Mosquito Blight")." It is there noted that three species of *Mœsa*, "occurring in the Darjeeling District, from 1,500 feet to 5,000 feet, are blighted in much the same manner as tea." It is not necessary to reprint the notes here, as the paper will be in the hands of everyone interested in Oriental Rhynchota. It is evident from the careful and lucid description that the bug described without a name—an omission which I have pleasure in remedying by proposing that of the author of the valuable observations—belongs to *Disphinctus*, differing by the proportions and colour of the antennæ, &c., from the other known species. The following is the original description (l. c. No. 5, p. 37):—

"♂: Orange-red; abdomen broad and concave on the upper side, "unmarked; head transverse, short; eyes black and prominent: "rostrum paler orange, thickened for the basal third of its length, "rather short, reaching just beyond the coxæ of the anterior legs when "folded beneath; antennæ almost the same length as the whole body; "first joint thickened, short reddish; second long; third shorter than "second; fourth short, all three black; pro-notum and scutellum un-"marked, orange red, the former lengthened, forming a rather long

" neck, the latter triangulate ; legs pale, semihyaline yellow, barred " with orange red on the femora ; the bases of the tibia also reddish ; " hemelytra with the basal two-thirds corneous and orange red, with a " triangular black spot on the costa ; the apical third fuscous, hyaline " with a discal nervure orange; wings fuscous with the bases transparent: " costal and discocellular nervures reddish. The hemelytra project far " beyond the abdomen longitudinally. Total length of insect ♂ $\frac{6}{16}$ of " an inch [= nearly 7 mill.]. The female only differs from the male " in being slightly paler in colour and in the underside of the abdomen " having a curved, corneous, black, shining ovipositor rising, as in *H.* " *theivora*, Waterhouse, from the centre of the sixth segment and " reaching to the eighth. The fertilised ♀ is streaked with whitish on " the underside of the abdomen. Total length, ♀ $\frac{6}{16}$ to $\frac{14}{32}$ of an inch." The ova are described and figured.

" *Habitat.*—Sikkim and Bhutan Himalayas, from 1,500 feet to 5,000 " feet (G. C. Dudgeon). Foodplant, the young leaves of *Mœsa mon-* " *tana* (D. C.), *Mœsa ramentacea* (A. D. C.) and *Mœsa indica* (Watt.). " Some species of Convolvulus is also attacked by this or an allied " form."

It is noteworthy that while the sexes are dissimilarly coloured in *Helopeltis*, the males in that genus being characterised by a more sedate appearance than that of their partners, in *Disphinctus* both sexes are very similar, if not indeed indistinguishable, in that respect. In *Helopeltis* the pro-notum, &c., of the male is always, so far as known, blackish ; that of female, reddish or yellowish. In *Disphinctus*, on the other hand, both sexes of *D. mœsarum* are blackish in general aspect; those of *D. humeralis*, *D. dudgeoni* and *D. formosus*, reddish.

Family TINGDÆ.

† ELASMOGNATHUS GREENI, Kirby, l. c., p. 109, Pl. IV, fig. 5.

† = *E. pallida*, Kirby, l. c., p. 110 (*nov. syn.*).

I do not think there is any doubt as to the correctness of this synonymy.

GALEATUS DARTHULA, sp. n.

Brachypterous: head armed with long spines, extending well beyond its apex ; first segment of antennæ reaching far beyond apex of head, three times as long as second, third segment eight times as long as second, and three times as long as fourth. Lateral margins of pronotum and elytra with a single series of areoles, carinæ of the former

simple. Pro-notal vesicle spherical, anteriorly obtuse, not (or very slightly) extending beyond apical margin of head or beyond the obtuse anterolateral angles of pronotum.

Long. $3\frac{1}{6}$—$3\frac{1}{8}$ mill.

CEYLON: Peradeniya (April 1900, E. E. Green), destructive to foliage of *Barleria cristata*, an ornamental shrub. [Reg. No. 197.] Type placed in British Museum.

Brownish-black; vesicles, elytra, &c. (except nervures), transparent, colourless or slightly tinged with brownish; antennæ (except apical segment) and legs (except tarsi) pale testaceous.

This is, I believe, the first species of *Galeatus* recorded from the Oriental Region, none of Walker's species of *Tingis* or *Monanthia* belonging to this genus.

SAKUNTALA, gen. nov.

Subfamiliæ Tinginarum [= Tingitariorum Stal] genus, *Seephanitidi* Fieb. [= *Tingitidi*, Leth., et Sev., nec Fabr.] subaffinis. Sulco rostrali anteriorim occluso. Pro-noto tricarinato; lateribus laminato-productis; vesicula subglobosa; processu postico posteriorim acuto; sulco sternali longitudinali carina transversa haud interrupta. Orificiis repugna torialibus distinguendis. Elytrorum areis discoidali ac costali haud conjunctim elevatis, areolis permultis subirregulariter instructis. Typo *S. ravana*, Kirkaldyi.

Rostral channel anteriorly closed. Capital spines not extending beyond apex of head; basal segments of antennæ almost contiguous. Pro-notum tricarinate, central carina anteriorly entire, longitudinally traversing vesicle, posteriorly evanescent; sublateral carinæ anteriorly evanescent. Vesicle subglobose, about one-fifth of total length of pro-notum. Pro-notum laminately expanded as far laterally as lateral margins of abdomen, the anterolateral angles being on a line with the base of the head: the margins of this lamination are reflexed and sinuate, irregularly quadrilateral. Pro-notal posterior process acute-angled. Stink orifices distinguishable, but not strongly marginate. Sternal sulcus not transversely interrupted. Discoidal and costal areas of elytra not conjointly elevated, costa dilated, irregularly reticulate, base of membrane contiguous with the posterior angle of pro-notal process. In our present ignorance of Oriental Tingidæ (probably less than a twentieth of the Tingid Fauna of that Region being known) it is

not possible to indicate exactly the natural alliances of this genus, which, however, seems to be structurally related to *Stephanitis*, Fieber, (*Tingis* of Lethierry and Severin's Catalogue.)

S. RAVANA, sp. n.

Macropterous: rostrum reaching to posterior coxæ; antennæ: two basal segments very short, third nearly three times as long as the fourth. Hind wings extending well beyond apex of abdomen, elytra extending as far beyond hind wings.

Long. 6½ mill.; lat. 3¼ mill.

CEYLON: Peradeniya (July 1897, E. E. Green).

Antennæ (except black apical segment), legs and underside of abdomen reddish-brown. Eyes black. Capital spines pale flavous. Pro-notum (except pale flavous posterior process) blackish-brown, with very short deep bronze pubescence; carinæ, vesicles and elytra pale golden flavous; elytra spotted and clouded with blackish (forming an irregular transverse band across the middle), especially on the membrane. Hind wings infuscate.

The nymph is remarkable for being laterally greatly expanded, each thoracic and abdominal segment (except the last two abdominal) sending out a stout subcylindric, long, prickly, lateral spine.

Family REDUVIIDÆ.

ECTRICHODIA, Lep. Serv.

The genera *Ectrichodia*, *Ectrychotes*, and *Physorhynchus* have been admitted in the third volume of Lethierry and Severin's Catalogue for (say) *lateralis*, Lep. Serv., *hæmatogaster*, Burm., and *lucidus*, Lep. Serv. respectively. However much authors may disagree as to certain details of procedure in the fixation of genotypes, there are surely two cases in which no doubt can arise, *viz.* :—

(1) when a new genus is proposed for a single species; and
(2) when, at the erection of a new genus, the author indicates a certain species as the type.

Ectrichodia was founded by Lepeletier and Serville (1825, Enc. Meth., X, p. 279) for a single species, *viz.*, their previously described *Reduvius cruciatus* (= *Cimex crux*, Thunb., 1783), and this species must therefore be the type. *Ectrychotes* cannot stand, since it was avowedly an orthographical alteration of *Ectrichodia*, and was intended by Burmeister merely to replace that name. *Physorhynchus*, Am. Serv. (founded for *crux*, Thunb., *lucidus*, Lep. Serv., and *barbicornis*, Fabr.), is co-extensive (? syntypical) with *Ectrichodia*, Lep. Serv.

The following synonymy is therefore necessary :—

(L) RHIGINIA, Stål., 1859.

= *Ectrichodia*, Stål., 1874; Leth. Sev., 1896,
type, *crudelis*, Stål = *ruficolis*, Stål.

(B) LARYMNA, Stål, 1859.

= *Loricerus*, Hahn. (p.p.), 1831 (invalid as not described, also name preoccupied).

= *Ectrychotes*, Leth. Sev., 1896,
type *albipennis*, Guer., = *violacea*, Hahn.

(V) *Ectrichodia*, Lep. Serv., 1825.

= *Loricerus*, Hahn. (p.p.), 1831, not described.

= *Ectrychotes*, Burm., 1835.

= *Physorhynchus*, Am. Serv, 1843 ; Leth. Sev., 1896.

= *Hæmatorrhophus*, Stål, 1874.

Type, *crux*, Thunb. = *cruciatus*, Lep. Serv.

ECTRICHODIA HORRENDA, sp. nov.

Shining, smooth, polished, the abdomen rugose only on the connexiva and on the 6th abdominal segment above and sparingly on the 3—5th segments above laterally. Apical margins of abdominal segments 1—4 serrulate along their entire length. Pro-notum constricted at the basal fourth. Anterior femora with one strong spine in the middle beneath, intermediate femora with two rows of two, posterior with a double row of one. Beneath, smooth, polished. Pro- and meso-sterna sulcate, the sulcation transversely striate. Meta-sternal tubercle lightly carinate.

Long. 22½—23 mill. ; lat. 10½ mill.

INDIA : (Colls., Edwards and Kirkaldy).

Upper surface bronze-green ; legs (except coxæ), sterna, &c., violet-black. Ventral surface greenish-black.

Distinguished by the colour and the comparative smoothness of the abdominal segments above.

E. LINNÉI, Stål.

Ectrichodia linnéi, Stål, 1859, O. V. A. F., p. 178, ♂ macr.

† *E. discrepans*, Walker, 1873, Cat. VIII, p. 46, ♂ macr., ♂ ♀ apt. (*nov. syn.*).

Physorhynchus linnæi and *tuberculatus*, Stål, 1874, Svensk, daka. Handl., p. 49; Reuter, 1881, Act. Sci. Fenn., XII., p. 32. ♂ ♀ apt. (*nov. syn.*).

The pilosity of the antennæ is a sexual character, and the difference in the structure of the pro-notum (in '*linnéi*' and '*tuberculata*') is doubtless due to the fact that *linnéi* represents the macropterous form, and *tuberculata* the almost or quite apterous form. I have examined a series of *Ectrichodia* in the British Museum, and have now before me 2 ♂ ♂ *linnéi* and three quite apterous ♀ *tuberculata*; I have no doubt but that they are the same species. They are all from Ceylon. The colour of the connexiva varies somewhat; in some individuals entirely bright scarlet, in others black with a sharply defined narrow exterior margin of scarlet, while in others the colours are confused, a neutral tint occupying the greater part of the connexiva.

Family GERRIDÆ.

A synoptic revision of the Oriental Gerrinæ (*Gerris*, *Cylindrostethus*, *Ptilomera*, *Metrocoris*, &c.) is nearly completed, and I ask Oriental Collectors to favour me with their duplicates (a few of each in alcohol, if possible). I want particularly fresh examples of *Gerris fluviorum*, Fabr. (? = *armatus*, Spin.).

Family PYRRHOCORIDÆ.

DYSDERCUS, Am. Serv.

A number of species have been recorded from the Oriental Region, but have not yet been revised on structural characters. The worker in India and Ceylon will probably be correct, however, in referring his captures to D. CINGULATUS (Fabr.). The principal synonyms are appended :

D. CINGULATUS (Fabr.).

Pl. A, figs. 11 and 12.

= *Cimex cingulatus*, Fabr., 1775, Syst. Ent., p. 719.
= *C. kœnigi*, Fabr., l. c., p. 720.
= *Lygæus olivaceus*, Fabr., 1798, Ent. Syst. Suppl., p. 540.
= *Pyrrhocoris kœnigi*, Hahn., 1834, Wanz. Ins., II, fig. 122.
= *P. poecilus*, H. Schäff, 1844, l. c., VII, fig. 699.
= *L. solenis*, H. Schäff, l. c., fig. 700.
= *P. pyrrhomelas*, H. Schäff, l. c., fig. 702. (*nov. syn.*)
= *Dysdercus Sidae*, Montr. 1861 Ann. Soc. Ent. France p. 68. (*nov. syn.*)

Normally (in Ceylon) deep scarlet ; antennæ (except the base of the first segment), eyes, membrane and a spot of variable size on the corium, tibiæ, tarsi, &c., black ; anterior margin of pro-notum pale yellowish-red. Sterna and venter adorned with ten transverse white stripes. In some examples the femora and the sublateral stripe on the anterior part of the pro-notum are more or less blackish ; in others the elytra, pro-notum, &c., are yellowish or yellowish-green instead of red.

Long. ♂ 10—14 mill., ♀ 14—16 mill.

INDIA : Cawnpore, Seringapatam, Cossipore, Kirkee, &c. CEYLON : Peradeniya, Hambantotta, Pundaluoya, &c. JAVA, SUMATRA, BORNEO, NEW GUINEA, COCHIN CHINA, CHINA, PHILIPPINES, NEW CALEDONIA, NEW HEBRIDES, LOYALTY ISLANDS, AUSTRALIA, &c. Principally from Cotton (*Gossypium herbaceum*), but also recorded from Bottle Gourds (*Lagenaria vulgaris*), Muskmallow (*Hibiscus abelmoshus*) and Cabbage (*Brassica oleracea*).

The genus *Dysdercus* is well known for the injury it causes to Cotton, though more notorious perhaps in the New World than in the Old. In the former, *D. suturellus* (Schäff) and *D. andreæ* (Linn.), and in the latter, *D. cingulatus* (Fabr.), are "cotton-stainers." Having received nymphs in three instars from Mr. Green, I have been able to construct a skeleton life history of the last-named, filling in some of the gaps from the details known of the American species (15) ; but as a good deal still remains to be done, and I hope to be able to examine other stages later on, the instars actually examined have not been described here. It may, however, be interesting to note that these three stages are apparently structurally separable from the corresponding stages of *D. suturellus*, figured and described by Riley and Howard.

Family LYGÆIDÆ = Coreidæ auctt.

Sub-family NEIINÆ.

= Berytidæ, Leth. and Sev.

HUBERTIELLA, gen. nov.

Cardopostetho, Fieberi affinis, capite supra convexo, rostro meta-sterni marginem apicalem attingente, segmento-primo capite breviore. Pronoto posterius elevato, trituberculato posterius ; meso-sterno ac meta-sterno sulcatis orificiis, meta-sternalibus permagnis. Scutello brevi, subhemisphæricali, spina longa ac curvata basim terminata. Typo *H. cardamomi*, Kirk.

(15) *See* Riley and Howard "The Redbug or Cotton-stainer," 1889, Insect Life, I, pp. 234—42.

Head above convex, arched, prolonged in front over the frons; rostrum reaching to apical margin of meta-sternum, basal segment shorter than head, reaching about as far as base of ocelli. Antennæ: first segment twice as long as second, third one-third longer than second and one-half longer than fourth which is thickened. Pro-notum posteriorly elevated, trituberculate posteriorly, also tricarinate, the carinæ not reaching the sinuate posterior margin. Meso-and meta-sternum sulcate, meta-sternal pneustocera (16) very large. Scutellum short, subhemispherical, terminated basally by a long, curved spine. Tarsi trisegmentate, first segment longer than the other two together, third longer than the second.

Apparently allied to *Cardopostethus*, Fieb., but differing in the points enumerated.

H. CARDAMOMI, sp. n.

Pl. X, fig. 16, and Pl. C, fig. 5.

Head and anterior lobe of pro-notum brown with yellowish hairs, posterior lobe yellow with large golden punctures; antennæ and legs yellow, thickly granulated with black; fourth segment of antennæ black except at the apex. Eyes black. Head beneath and sterna blackish with yellow hairs. Elytra hyaline, membrane infuscated. Abdomen dorsally pale red-brown; ventrally the same colour with an obscure sublateral fuscate line, the whole thickly covered with very short pale hairs.

Long. 6 mill.

CEYLON: Pundaluoya (June 1898, E. E. G.) "Common on the under-surface of leaves of Cardamom, *Elettaria cardamomum*" (E. E. G.).

Sub-family HYGIINÆ.

= Lybantaria, Stål, 1873.

DISTANTIDEA, gen. nov.

Colpura, Berge, affinis, sed magis depressa; capite subporrecto, multo longiore quam inter oculos latiore; rostro longissimo, segmento primo pone capitis basin distincte extenso; antennarum segmento quarto tertio multo breviore. Pronoti marginibus lateralibus apicem versus inerscutello plano. Elytris completis, membranæ venis furcatis, hic et illic mibus; anastomosantibus. Femoribus posticis nec incrassatis nec denticulatis Abdomine sulco destituto. Typo *D. vedda*, Kirk.

(16) "Athemhörner" of Fieber 1859, Wien. Ent. Mon. III, 207, but they appear to be the orifices of the stink glands.

Depressed, head subporrect, much longer than wider between the eyes; juga and tylus well produced; slightly constricted behind the eyes. Eyes prominent, globose, situated at some distance from the base of the head. Ocelli distinct, nearer to the eyes than to one another. Antennæ slender, long (except the shorter, subincrassate fourth segment); rostrum very long, first segment extending distinctly beyond the base of the head. Lateral margins of pro-notum unarmed, but slightly prominent anteriorly; scutellum unarmed. Meso- and meta-sternum widely and deeply furrowed, elytra complete, nervures of the membrane fumate, here and there anastomose. Posterior femora neither incrassate nor denticulate. Apical angles of the abdominal segments obsoletely prominent; abdomen ventrally not sulcate. Connexiva extending beyond lateral margins of the elytra. This remarkable genus, which is named after my friend, Mr. W. L. Distant, to whose labours so much of our knowledge of Oriental Rhynchota is due, appears to be very distinct both in structure and facies from any other Lybantine.

D. VEDDA, sp. n.

Plate A, fig. 15, and Plate C, fig. 3.

Finely and coarsely granulate and covered with short golden pubescence. Tylus very slightly longer, and much more elevated than the juga; antennæ (inserted at sides of head between the apex and eyes, distant from either) four and a third times longer than the head; second segment one-half longer than the first and one-third longer than the third, which is two-thirds longer than the fourth. There is a transverse furrow in front of the eyes, and at right angles to it, a short, longitudinal median furrow which forks right and left in semicircular furrows. Lateral margins and base of pro-notum sinuate, the former reflexed. First segment of anterior tarsi one-fourth longer than the second and third together; third twice as long as second apex of cornimacute.

♂ Rostrum reaching to apex of 6th segment; connexiva more parallel-sided, not extending far beyond lateral margins of elytra, which generally extend as far as apex of abdomen. Long. 16 mill.

♀ Rostrum reaching to apex of 5th segment; abdomen laterally rounded, connexiva extending farther beyond lateral margins of elytra which do not in general extend so far as the apex of the abdomen. Long. 19½—20 mill.

Pale fuscous, mottled and spotted with dark fuscous and black. Base of 2nd and 3rd middle of 4th antennal segments pale greenish, testaceous. Connexiva and legs banded with dark fuscous, pale fuscous, and testaceous. Base of elytra narrowly sanguineous (concealed by pro-notum); membrane pale purplish-brown, at the base pale fuscous with four large irregular black spots. Venter sordid fuscous, with a broad blackish sublateral longitudinal band; spiracles pallid-bordered. Abdomen dorsally sanguineous.

CEYLON: Kandy (E. E. G. XI, 1897—) Collns., Green and Kirkaldy. The types (♂ ♀) have been placed in the British Museum.

Sub-family BRACHYTINÆ.

= Daladeridæ, Leth. and Severin.

BRACHYTES BICOLOR, Westw.

Plate A, fig. 13, and Plate C, fig. 4.

The type of the genus, occurring in India and Ceylon. Specimens were sent me by Mr. Green, with the information that they were "swarming in a tangled mass of *Asparagus falcatus*" in the Royal Botanic Gardens at Peradeniya [Reg. No. 10]. "During the daytime they congregate in a mass in the very centre of the plant." The stinkglands in the imago emit a "strong—rather sweet—scent of Jargonelle," which perfumed the alcohol in which the specimens were preserved, and the bugs themselves retained the odour for several weeks after transference to my cabinet.

Three nymphs were also sent, which, despite the difference in their size and in the development of the wing cases, clearly belong to the same instar, doubtless the last. One of the larger is depicted on Pl. 1, fig. 14, and the following description is added :—

Head, antennæ, legs, &c., strongly granulate. Head sulculate anteriorly just behind and between the antenniferous tubercles which are stout and very prominent. Second segment of antennæ one-half longer than first, very slightly longer than third which is very slightly longer than fourth. Rostrum reaching to apical margin of meso-sternum. Pro- and meso-notum very narrowly and superficially sulculate longitudinally, the former sparingly granulate, more strongly laterally and posteriorly. Pro-notum widened and elevated posteriorly 2½ times as wide posteriorly as anteriorly; lateral and posterior margins sinuate: apex of elytral cases reaching (in the largest specimen) to about the middle of the second abdominal segment. Each of the femora

with a small spine near the apex. Tarsi 2-segmentate, the segments subequal. Abdomen notably rounded laterally, twice as broad across centre as the pro-notum between posterior angles; finely and sparingly granulate above, also very closely punctured *beneath* the nymph-skin; apical margin of second segment very slightly and narrowly excavated medianly, third and fourth narrowly, but deeply, excavated, a large glandflap being present (17), 5th sinuate widely, but superficially, 6th roundly and superficially excavate. Three genial segments present, the third truncate posteriorly. Spiracles large, round near the lateral margins of the abdomen.

Long. (No. 1) 11½ mill., (Nos. 2 and 3) 18 mill.; lat. (No. 1) 7 mill., (Nos. 2 and 3) 11 mill.

Somewhat dull scarlet, lighter on abdomen. Antennæ, lateral margins of head, lateral and posterior margins of pro-notum, legs (except coxæ), lateral margins of wing-cases, apical margins of abdominal segments, stinkgland flaps, and lateral margin (in part) of abdomen black.

Sub-family MYODOCHINÆ.

Myodochus, Latr.

The type of this genus was fixed by Leach in 1815 as *tipuloides* (de Geer), although authors have almost to a man accepted for this position *serripes*, a totally different bug, belonging indeed to another family, and despite the fact that *serripes* is not an original species and therefore cannot, under any circumstances, become the type of the genus. The following synonymy will be noteworthy :—

1. Family GEOCORIDÆ = Lygæidæ, Auctt.

Genus CHIROLEPTES, Kirby, 1837.

= *Myodochus*, Oliv., 1811.

= *Myodocha*, Auctt.

Type *raptor*, Kirby = *serripes* (Oliv.).

2. Family LYGÆIDÆ = Coreidæ, Auctt.

Genus MYODOCHA, Latr., 1807.

= *Leptocorise*, Latr., 1825.

= *Leptocorisa*, Latr., 1829, et auctt.

Type *tipuloides* (de Geer).

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(17) From the abdominal glands, these nymphs "pour forth a viscid, brownish-orange, stinking fluid which dissolves readily in alcohol, staining it the colour of Iodine."—(E. E. G. *in litt.*, Oct. 24, 1899.)

The well-known rice-pest, formerly termed *Leptocorisa acuta* (Thunb.), belongs to this genus, and should now be known as *Myodocha acuta* (Thunb.).

Localities.

Dundubia spinosa (Fabr.), British Borneo (a fine ♂ of the var., with somewhat spotted tegmina, expanding 137 mm., Coll., Edwards).

Phymatostetha stellata (Guér), British Borneo (Coll., Edwards).

Cosmoscarta octopunctata (Am. Serv.), British Borneo (Coll., Edwards).

Aspongopus brunneus (Thunb.). CEYLON: Pundaluoya (Sept. 1897, E. E. Green, one specimen), not previously recorded from Ceylon.

ADDENDUM.

On p. 49, *Polydictya Krisna* was described (Pl. A., fig. 4). Although according with the short descriptions of Burmeister and Stål, it is evidently not a true *Polydictya*; the latter genus having much broader elytra and wings (the latter also more lobate) and a differently shaped head, while the wings are much more densely reticulate. It is therefore necessary to erect a new genus.

THAUMASTODICTYA.

Vertice oculis circiter quadruplo latiore, basi leviter obtuse emarginato. Fronte aeque lata ac longa, basi obtusa, levissime reflexe, processu destituta, marginibus lateralibus sat sinuatis, sursum subangustata, apicem versus utrimque sublobata; basi obtusangulato, apice ampliata et clypeo distincte latiore. Elytris apicem versus paulo ampliatis, triplo longioribus quam mediatim latioribus, reticulatis Venis duabus clavi posterius in unam conjunctis, hac vena pone apicem apertum clavi; longe continuata. Alis reticulatis.

Tibiis anticis hand dilatatis, femoribus longitudine fere aequalibus.

Type T. KRISNA (Kirkaldy).

† *Polydictya Krisna*, Kirk, 1902, J. Bomb. Nat. Hist. Soc., XIV, p. 49. Pl. A, fig. 4.

EXPLANATION OF PLATES.

Plate A.

1. *Pyrops maculatus* (Olivier), 1ª head in profile.
2. *P. coccineus* (Walker), 2ª head in profile.
3. *Zanna dohrus* (Stål), 3ª head in profile.
4. *Thaumastodictya krisna* (Kirk).
   (= *Polydictya krisna*, Kirk, olim.)
5. *Flata ocellata* (Fabr.).
6. *Thaumastomiris sanguinalis* (Kirk).
7. *Berta lankana* (Kirby).
8. *Hyalopeplus rama* (Kirby).
9. *Isabel ravana* (Kirby).
10. *Disphinctus formosus* (Kirk).
11. *Dysdercus cingulatus*, var. *olivaceus* (Fabr.).
12. *D. cingulatus* (Fabr.).
13. *Distantidea vedda* (Kirk).
14. *Brachytes bicolor* (Westw.).
15. „ ultimate instar of nymph.
16. *Hubertiella cardamomi* (Kirk).

Plate B.

1. *Dichoptera hampsoni*. Distant—tegmen.
2. *Pibrocha egregia* (Kirby) „
3. *Pundaluoya ernesti* (Kirby) „

3*a*. „ antenna
4. *Thaumastomiris sanguinalis* (Kirk.), head.
4*a*. „ elytron.
4*b*. „ wing.
5*a*. *Berta lankana* (Kirby), head.
5*b*. „ elytron.
5*c*. „ wing.
6*a*. *Hyalopeplus rama* (Kirby), head in profile
6*b*. „ elytron.
6*c*. „ wing.
7. *Isabel ravana* (Kirby), elytron.

Plate C.

1. *Isabel ravana* (Kirby).
1*a*. „ antenna.
2. *Disphinctus formosus* (Kirk), elytron.
2*a*. „ wing.
3. *Distantidea vedda* (Kirk), wing.
4. *Brachytes bicolor* (Westw.), wing.
5. *Hubertiella cardamomi* (Kirk), elytron.
5*a*. „ wing.

NOTES ON THE HOG DEER IN BURMA.

By Veterinary Captain George H. Evans, A.V.D.

(*Read before the Bombay Natural History Society on 18th Feb.*, 1902.)

(*With 2 Plates.*)

CERVUS PORCINUS.

Burmese names.—Dayai or Darai.

Hog deer are plentiful in many parts of Lower Burma, particularly so on the grassy plains and grass-covered islands in the delta; they are also met with in suitable localities in Upper Burma, and are numerous on the Pedaing Plain, Myitkyina District, where, I understand, many may be seen out grazing in the early mornings and evenings.

They are confined to the plains, never, as far as I am aware, being found in the hills, or in heavy jungles, though they will frequent grass land in open jungle. They are often found in the belts of long grass, seen on the banks of some rivers, and many inhabit the stretches of grass and mangrove jungle near the sea. In my experience, wherever Thetkai grass (*Imperata cylindrica*) abounds, they show a preference for it, possibly because not being so dense as the Kaing (*Saccharum spontaneum*), it is cooler; but where grounds are much disturbed, they [illegible] shelter in the heaviest elephant grass cover available. Though many deer of both sexes may live in a particular stretch of grass country, they never, as far as I know, collect in herds, but are generally found solitary, though at times two or three may be put up not far [illegible] may even be seen grazing together.

[illegible] they graze from about 5 p.m. till 7 a.m., though in secluded and [illegible] disturbed localities they may begin to feed earlier, and leave off later. I have never found them grazing far from cover, apparently preferring to keep to the small hidden glades or kwins, and the depressions or yès, sometimes met with between patches of long grass.

The deer without doubt graze on the large kwins (plains) during the night, as their tracks may frequently be seen in such places in the morning. Their food consists chiefly of grasses, such as Myet-za [illegible] (*Dactylon*), the tender shoots of the Kaing, which springs up after it is fired, Doung Sa-ba, Nat Sa-ba or wild rice (*Oryza coarctata*) and others. I have frequently found them grazing on a leguminous plant, the Nyan Bin (*Desmodium reptans*) which grows

A.

Mintern Bros Photo-imp London.

THE HOG-DEER.

(Cervus porcinus)

luxuriantly in many places in Lower and Upper Burma, and to which brow-antlered deer are also partial. Burmans have informed me that hog deer will under cover of darkness enter cultivation if in the immediate vicinity of cover.

These animals usually go to water just before or shortly after dark. When returning to camp late in the evening, several deer may be put up in the grass leading up to the water-supply. During the day they lie concealed under the grass, and do not, like the Thamin stags, leave it to wallow in the mud and slush of drying up pools.

The hot weather (about the middle of March) is, perhaps, the best time of year to hunt them; the greater portion of the heavy grass has by that time been burned, and the water-supply is limited. Hog deer may occasionally be stalked, but, in order to obtain such sport, a knowledge of all the likely places to find them is requisite; these can then be visited during the early hours of the morning, and, with luck, one or two may be discovered grazing, in which case, with ordinary care, a successful stalk may be made, as they are not more difficult to approach than other deer. Shooting from elephants may also be tried, but as well-trained *shikar* elephants are distinctly rare over here, it cannot be recommended. I certainly have not had the good fortune to find one. A few years ago, a friend and I, being anxious to try this method, procured two elephants—ordinary timber-working animals; the only thing to recommend them was that they stood fire fairly well, but were, nevertheless, nervous and easily scared. Having no howdahs, we were obliged to sit in ordinary Burmese elephant baskets which were most uncomfortable. The elephants afforded us plenty of excitement, and we obtained many shots; but owing to their everlasting antics and the fact that we used rifles, the bags were extremely small. We hoped in the following year to make better arrangements, but were not given the opportunity, as some one stole the elephants. Other means had to be devised for circumventing them. After consultation with the *shikaris*, it was decided to construct a moderately high seat, or small platform, and to fix it into a bullock cart; to lessen the effects of the terrible jolting, pillows (gunny bags filled with straw) were used. A steady pair of bullocks with a *shikari* as driver rendered this contrivance an admirable substitute for an elephant. Close, but not always easy, shots were obtained, and my experience is that a bolting hog deer is an uncommonly hard target to hit. The great objection to the use

of the bullock cart is that bullocks are so dreadfully slow over rough ground. Some hog deer lie so close as to get up almost under an elephant's feet or just in front of the bullocks. If a stag happens to be bolting in the direction of low grass near by, it is advisable not to fire, for, not infrequently after rushing for some thirty or forty yards, he may pull up for a few seconds, in which case an easy shot is obtained.

Stags may be decoyed to leave cover by imitating "calls," at which some Burmans are very clever. This is usually done by placing a blade of grass between the thumbs, closing the hands, and blowing into them. Professional *shikaris*, who go in for selling flesh to villagers, take every advantage of this method, and thus kill many deer. Another plan employed by the Burmans is as follows.—On a very dark night two or three men proceed to grounds frequented by deer. The leader carries a light on his head (the light is usually placed in a basket or pot with the front removed); this man also has bracelets, and at times anklets, to which small bells are attached. The confederates follow close behind. The tinkling of the bells no doubt attracts the attention of the deer who stands in astonishment at the glare of the light, and even advances towards it, and, when close enough, is cut down or speared. When Burmans were permitted to carry firearms, they shot the deer.

During the hot season, and also towards the close of the rains, villagers often hunt hog deer with dogs, so called Pegu hounds, and at times have excellent sport, as the deer cannot sustain a high speed for any length of time. I have known the dogs to run three deer down by 8 a.m. This form of sport is most exciting, but, unless one is in the "pink" of condition, owing to the heat the strain is too great on an European.

The name hog deer, no doubt, originated from their peculiar action when running which is certainly hog-like. When alarmed or disturbed they go off with a rush, galloping low, carrying the head well down, with the tail erect, and the constant bobbing of the tail is very often the only visible portion of the beast as he rushes wildly through the long grass. The Burmans believe that there are two kinds of hog deer—one they call the Dayai-pyauk (spotted), the other, Dayai-nyo (brown); the latter is said to be smaller than the former. For my own part, I do not believe the statement to be correct; and, in my opinion, the idea is founded on the fact that an occasional adult like many fawns is distinctly spotted.

The rutting season is April and May. Tame stags sometimes show a tendency to be vicious during this period. In the natural state, however, I do not think they can be very combative, for the simple reason that they do not collect in herds, and thus males have not to fight for the hinds ; and, further, if fights were of frequent occurrence, head with broken points would constantly be met with, whereas it is in my experience unusual to find an imperfect head.

The hinds, I think, commence to breed during their second year. The period of gestation is from six to seven months ; the young ones are born in the long grass during October and November. There is usually one calf at a birth. I have never heard of twins. In the gardens here the hog deer sometimes drop their young as late as March and April.

The majority of stags cast their antlers during the months of July and August, though some retain them as late as towards the close of September, and at the present time (20th October) there are three young stags in the gardens here still with their horns on (prongs), while all the old stags are showing from 2″ to 4″ of their new antlers in velvet. I have met with stags in velvet as late as the first week in March and one stag as late as the 3rd of May.

Description.—These deer are rather long in the body and low on the legs. The relative shortness of the fore limbs gives them a peculiar appearance, *i.e.*, they are low in front, the croup is slightly arched, and the hind legs are carried well under the body. The stags have neither mane nor ruff. Hog deer gallop low, and, when running, the tail is invariably erected by a strong muscle, in many animals curling so much as to touch the back. While moving in the open, the head is not carried low, as is the case when moving through cover.

Colour.—General colour darkish-brown, with a more or less decided yellowish or chestnut tinge, and a faint speckling or mottling through the coat. There is a certain similarity of the coat to that of the ordinary Indian mungoose. The under-parts and the legs from the shoulders and thighs down are much darker in colour than those of the upper parts of the body, and are especially marked in old stags. The colour of the hair on the under-surface of the tail, perineum, and inside thighs is white, as also is the hair lining the inside of ears and that of the chin. The colour of the hair covering the face and head is generally slightly paler than that of the body, while that surrounding

the orbits is often lighter. The cause of the mottling will be evident on examination of hairs from various parts of the body. In some parts the hairs will be noticed to be white at the base, then pale brown, then white, the tips being very dark-brown. There is, of course, considerable difference to the extent to which the alternate pale and dark rings are developed—for example, in the very dark stags the pale rings are very narrow indeed.

These deer show a remarkable tendency to develop spots through the coat. The young, like those of many other varieties of deer, are frequently menilled; but in this country, at any rate, it is by no means rare to find one or more adult stags and hinds distinctly spotted. The spots are so evident, and disposed in such a manner, as to give the animal the appearance of a small Cheetal (*Cervus axis*). I have also met with animals marked with pale brown spots disposed in rows on either side of a faint dorsal stripe. The spots in the coat are not constant in the same animal. I have from time to time kept these deer as pets; two stags were in my possession eight years—one, a very dark stag, only during one season showed distinct menilling, while the other stag during two or three seasons was almost as prettily spotted as a Cheetal. The spots appeared at the moult, and, as a rule, grew fainter and fainter till they almost or quite disappeared.

The ears are moderate in size, the eyes full and bright, and the muzzle rather narrow. The tail is long and covered with long hairs, some of the under white hair of the tuft being longer than the brown hair above.

Heads.—In size and shape the horns vary. Normally there are six points, *viz.*, those of the brow tines and terminal forks. The horns are very free of sports and snags, and are not rough or rugged.

The antlers are mounted on bony pedicles varying from 1″ to 2″ in length. The basal or brow tine is given off immediately above the burr, and is directed upwards so as to form a more or less acute angle with the beam. The beam generally runs up, taking a slight outward curve about a third to half of the way up; there are, however, many heads in which a few inches above the burr the beam takes a fine outward curve, thus giving the heads a beautiful sweep.

The upper tine is given off from the inner, and slightly towards the posterior surface of the horn, at about two-thirds the length of the beam with which it forms almost a right angle, and is directed usually

Mintern Bros. Photo imp. London.

THE HOG-DEER.
(Cervus porcinus)

more inwards than backwards. In some heads this tine springs more from the posterior than the inner surface of the beam, and in such cases it is usually directed backwards. The front tine of the fork, which is the continuation of the beam, is always the longer.

With regard to the size of heads, I should class antlers from 12″ to 14″ as good, anything between this and 20″ as very good, and any measurement over, exceptionally so. I have been fortunate in bagging some fine specimens of this deer, the best head measuring 23¼″ on the outside curve.

The Burmans state that the stags develop prongs during their second year, when they are known as "Gyo-soo," *i.e.*, needle points, and that the full number of points are not acquired till they enter their fourth year, when they are described as "Gyo-hnit-kwa" (referring to the terminal fork).

The voice of the Dayai stag is a rather sharp, short bleat; that of the hind is more plaintive.

Height.—23″ to 26″.

The following are measurements taken of four ordinary stags and one hind. Nos. 1 and 4 were spotted, and Nos. 2 and 3 without spots, and in better condition than No. 1 :—

	♂ 1	♂ 2	♂ 3	♂ 4	♀ 5
Height at shoulder	24½″	26″	27″	25½″	24½″
Girth behind shoulder... ...	32¼″	33½″	32½″	28½″	29½″
Girth base of neck	19″	...	20″	...	...
Length from muzzle to dock ...	41″	42½″	49″	48″	46½″
Length of tail	...	...	4½″	6¼″	4″
Do. with tuft ...	6½″	7⅝″	6″	9½″	7″
Length of head	...	...	11″	9½″	10½″
Breadth between eyes... ...	3″	...	3¼″	3½″	3″
Horns	14½″	11⅝″	Velvet.	6″	*Nil.*

I have to thank Mr. D. J. Morrison for the accompanying photograph of a typical pair of horns of the hog deer, and Mr. W. Stikeman for the picture of a dead specimen of this species.

THE EARWIGS OF CEYLON.

By Malcolm Burr.

With Plates A., B. (*reproduced by permission of the Entomological Society of London*).

(*Continued from page 78 of this Vol.*)

LABIDURA, Leach.

Body stout, flattened in front; abdomen convex; antennæ with more than twenty segments. Elytra and wings well developed, the latter sometimes absent by aberration; first tarsal segment equal to the other two. No lateral tubercles on the abdomen. Second tarsal segment simple. Forceps, ♂, with the branches remote at the base, simple, slightly arcuate, toothed on the inner margin in some species; in the ♀ simple, straight, conical, incurved at the tip.

Labidura, Leach., 1815, Edinb. Enc., ix., 118.
Dohrn, 1863, Stett. Ent. Zeit, xxiv., 309. Borm. 1900, Forf. 31.

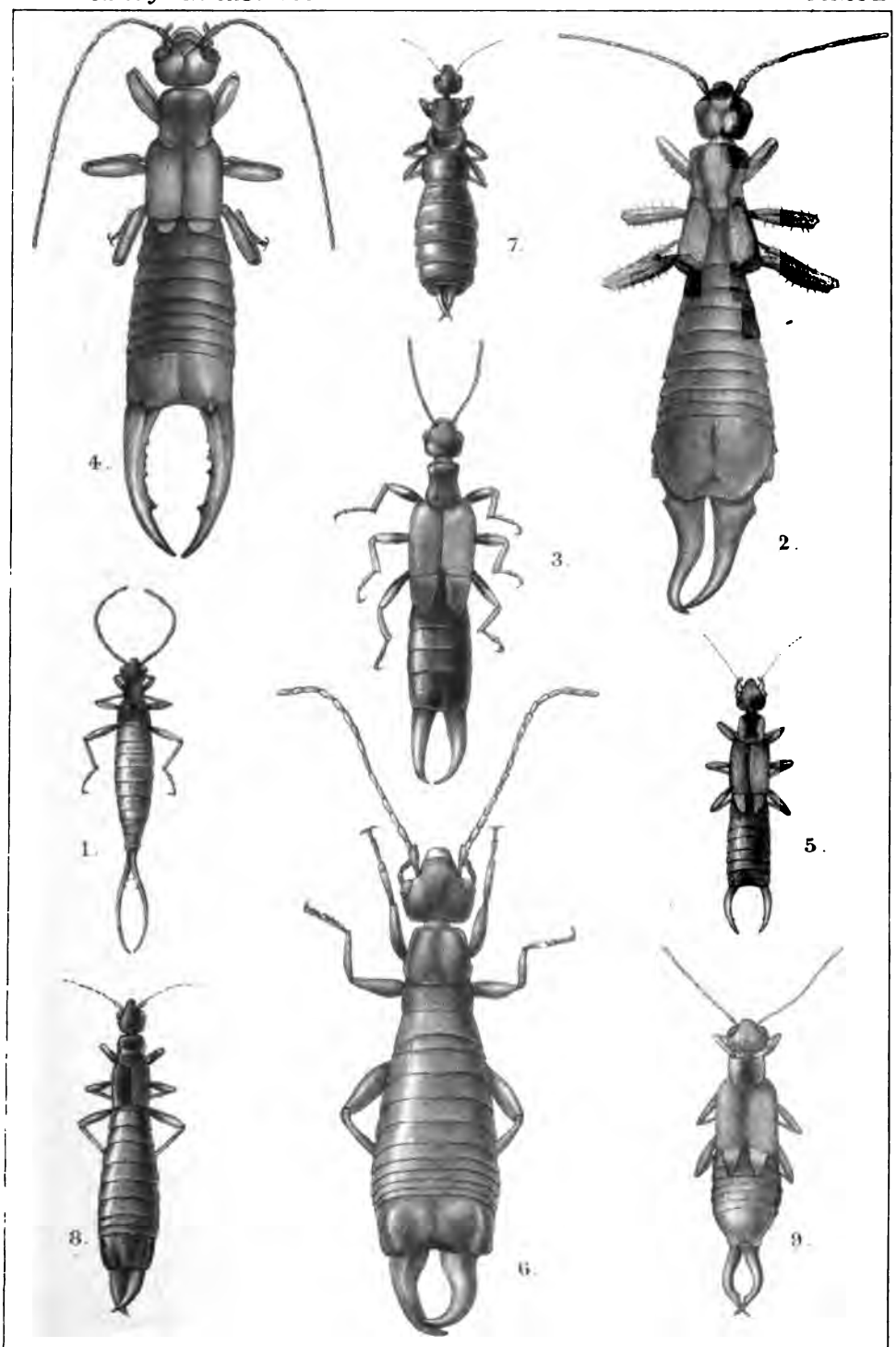
This genus may be known by its long antennæ, well developed wings and elytra (only very rarely are the wings abortive).

Table of Species.

1. Size middling or large. Colour red or reddish-brown.
   Forceps toothed on the inner margin in the ♂; pronotum with hinder border straight, with the angles rounded.
   2. Abdomen dilated near the apex in a straight line from the shoulders of the elytra to the bases of the forceps ..... 1. *RIPARIA*, Pall.
   2·2. Abdomen strongly dilated at the apex, but not in a straight line from the shoulders of the elytra. The anal segment is always very considerably dilated ..... 2. *BENGALENSIS*, Dohrn.
1·1. Size very small. Colour dull-fuscous. Forceps not toothed on inner margin in the ♂. Pronotum regularly rounded entirely behind ..... 3. *DUFOURII*, Desm.

LABIDURA RIPARIA (L).

Reddish-testaceous; antennæ paler. Pronotum with the margins pale, the posterior margin slightly rounded. Elytra reddish on the inner margin. Wings not very prominent, or not even projecting, pale. Feet pale. Abdomen dark above and beneath, the sides somewhat paler, all the segments rugose, slightly hairy on the hinder margins. The pygidium is flat and depressed. In the ♂ the anal segment is slightly depressed in the centre



E. H. J. Schuster del. Mintern Bros. lith. London.

CEYLON FORFICULARIA.

above, with a small tubercle on each side at the insertion of the forceps; the hinder margin with two teeth, or rarely unarmed ; the branches of the forceps testaceous, darker towards the apex, remote at the base, slightly curved, upwards towards the apex, and inwards ; the whole inner margin is denticulate, and armed with a large tooth beyond the middle. In the ♂ the anal segment furnished with two tubercles, the posterior margin smooth, the branches of the forceps are not contiguous, curved gently inwards, unarmed, denticulated all along the inner margin.

This species varies very considerably in size, colour, and armature of the forceps.

	♂	♀
Length of body	13-19 mm	13-19 mm.
„ „ forceps	6-11	4·5-6

Forficula riparia, Pallas., 1773., Reisen., II., Anhang 727.
Labidura riparia, Dohrn, 1863, Stett. Zeit. XXIV., 313.
Scudd., 1876, Ent. Notes, V., 63.
Brunner, 1882, Prod., Our. Orth., 5, fig. 1.
Borm. 1900, Forf. 33.
Forficula gigantea, 1 Fabr. 1793. Ent. Syst. II,
Fischer, 1853, Orth. Eur., 65., tab. L., fig. 1, la—f.

The references to this species in literature are so numerous that I have only given the more important. Brunner and Scudder give the full synonymys. It is a species which varies to such an extent that it has been quoted under very many names, such as *pallipes, dentata, bilineata, maxima, bidens, crenata morbida, bicolor, fischeri, herculeana*, etc., and others.

It is a cosmopolitan species, but probably Palæarctic in origin. Mr. Green has given me a specimen from Ambegammoa, February, 1899, where it was found in a bungalow. Its natural haunts are the banks of rivers, and shingle by the sea-shore.

Dohrn gives a synopsis of its varieties with their synonymy, and de Bormans gives to subspecies.

LABIDURA BENGALENSIS, Dohrn.

Large, reddish. Head dark-red, the eyes black, and antennæ paler. The pronotum square, with rounded angles, slightly narrower than the head, black. Elytra broad, well developed, black, with a bright chestnut stripe on each along the suture. Wings projecting well beyond the elytra, pale-testaceous, dark at the apices on the inner margin. Feet uniform testaceous. Abdomen dark-red, smooth. In the ♂ it is dilated considerably towards the apex; the anal segment is very large and smooth, armed with two indistinct tubercles at each side at the base of the branches of the forceps ; in the ♀ the abdomen is cylindrical, not dilated. Beneath it is pubescent above bare in ♀. In the ♂ the forceps are stout, the branches widely distant at the base, slightly diverging at first, then gradually converging inwards until they almost meet at the apices, armed with a tooth on the

inner margin near the base, and two or three blunt denticulations in the ipræ-apical third; the branches are reddish, but darker at the apex. In the ♀ the branches are stout, not contiguous, straight, reddish at the base, black at the apices where the points curve in and meet; they are armed with strong denticulations throughout their length. ♂ ♀.

	♂	♀
Long. corporis.....	22-26·5 mm.	19·5-22·5 mm.
„ forcipis	9-·2·5	7

Labidura bengalensis, Dohrn, 863, Stett. Ent. Zeit., xxiv., 312.
Borm. 1900, Forf. 33.

Psalis bengalensis, Scudd, 1876, Ent. Notes, V., 67.

Habitat.—Bengal (Dohrn).

In the Brussels Museum there are two males and one female labelled "Ceylon." They seem to be larger and finer than specimens from Calcutta.

LABIDURA LIVIDIPES, Duf.

Small, dark castaneous, the whole body pubescent. Antennæ with 17-21 segments. The pronotum is more or less elongate, the lateral margins pale, sometimes bluish. The elytra are long, the posterior margin truncated, fuscous. The wings are fuscous, prominent, sometimes thinly bordered with light-blue. Sternum pale; feet shining, pale, the femora darker towards the apex. In the ♂ the anal segment is plain and unarmed, the branches of the forceps are not curved upwards, not very long, incurved to meet at the apices, with a small tooth on the inner margin, at the apical third. In the ♀ the branches of the forceps are not contiguous, unarmed on the inner margin.

	♂	♀
Length of body.....	8-9 mm..	...8 mm.
„ „ forceps.....	2·3-3·2	2·2

Forficula lividipes, Dufour, 1828, Ann. Sci. Nat. XIII, 340.

Forficula dufourii, Desmarest, 1820, Faune franc., Orth., pl. I., fig. 27.
Scudd., 1876, Ent. Notes, V., 62.

Forficula pallipes, Duf., Ann. gén. des sc. phys. de Bruxelles, VI., 316, tab. 96, fig. 7, a,b.

Labidura pallipes, Dohrn, 1863, Stett. Ent. Zeit., XXIV., 317.
Bol., 1878, Ort. de Esp., 22, tab. I., fig. 9, a, b.

Labidura lividipes, Borm. 1900, Forf. 36.

Forficesila meridionalis, Serv., 1839., Orth., 26.

Forficula (*Labidura*) *meridionalis*, Fisch., 1853, Orth. Eur., 67, tab. 6, fig. 3a.
Fieb., 1853, Syn., 72, Erganzungsbl. Lotos., V., 90.

Forficesila vicina, Luc. 1846, Expl. de l' Alg. Orth., p. 5, tab. I., fig. 2.

Labidura dufouri, Brunner, 1882, Prod. Eur. Orth., p. 7.
Borm., 1888, Ann. Mus. Civ. Gen. (2), vi., 434, id., 1894 op.cit. (2), xiv., 378.

This is another cosmopolitan species, originating almost certainly from the Mediterranean Subregion. I have received numerous examples taken in Ceylon by Mr. Green, and it is common also in India and in Burmah. It occurs in fact in all tropical districts, where it has been spread by shipping.

Punduloya, Chilaw, xi., 97, caught at light.

ANISOLABIS, Fieb.

Body long and slender. Colour black, shining, varied with testaceous or reddish. Antennæ with about 20 segments, first and third tarsal segments of about equal length. Elytra entirely absent or represented by barely distinguishable rudiments. Wings entirely absent. Lateral plications of the abdominal absent or very faint. Forceps short, stout, in the ♂, often strongly curved in, semicircular, with right branch more strongly curved than the left, or conical, strongly arcuate, pointed, not toothed ; in the ♀ the branches are contiguous, simple, conical.

Anisolabis, Fiebr., 1853, Lotos., iii., 257.

This genus may be recognised by its shining black or very dark brown colour, total absence of organs of flight and simple forceps. The feet are usually testaceous, sometimes varied with black bands ; the antennæ often have white rings, but this is a very variable and unstable character.

de Bormans retains *Brachylabis*, Dohrn, for *B. punctata*, Dubr., and *B. chilensis*, Blanch.

Dohrn's names, *Forcinella* and *Brachylabis*, fall before the prior *Anisolabis*, Fieber.

TABLE OF SPECIES.

1. Mesonotum bearing rudiments of elytra. Forceps contiguous at the base ..... 1. *GREENI*, Burr.

1·1. Mesonotum with no rudiments of elytra.

2. Forceps, ♂, strongly incurved, remote at base. Size large, insects stout ..... 2. *KUDAGÆ*, sp. n.

2·2. Forceps of ♂ gradually incurved or nearly straight. Size smaller, more slender and narrower insects.

3·3. Antennæ and feet ringed ..... 3. *ANNULIPES*, Luc.

3·3. Antennæ and feet unicolorous ..... 4. *BRUNNERI*, Dohrn

ANISOLABIS GREENI, Burr.

Medium size. The body entirely very finely granulated, clothed with a few long pale hairs ; antennæ with fifteen segments, the pronotum square, slightly narrower than the head, very slightly broader posteriorly than anteriorly ; the mesanotum bears on each side prominent rudiments of elytra. Anal segment attenuated, sulcate in the middle, furnished with a small tubercle on each side above. The head is black and shining, the palpi and mouth parts brick-red ; antennæ with the first segment brick-red, the rest black, except the four apical segments which are pale. Thorax shining-black. Abdomen shining-black, reddish beneath. Feet brick-red, the tarsi testaceous ; the

femora banded with fuscous at the base and at the apex. Forceps black. In the ♂ the subgenital lamina is triangular, obtuse ; the branches of the forceps stout, contiguous, conical, unarmed, strongly decussating at the apex, the right branch curved more strongly than the left and above it. In the ♀ the subgenital lamina is obtuse and triangular ; the branches of the forceps straight, and stout, distant at the base with a small tooth on the inner margin in the middle, attenuated towards the apex, incurved, and touching, or slightly decussating.

Length of body, 11·5-13 mm ♂., 17 mm ♀ ;
„ of forceps 2 mm. ♂, 3·25 mm. ♀.

Anisolabis greeni, Burr., 1899, Ann. Mag. N. H. (7), IV, 257.

This handsome species, which I was very pleased to dedicate to Mr. E. E. Green, seems to be fairly common in Ceylon, especially at Punduloya, whence Mr. Green has sent me a good number of specimens at various times of the year ; it seems to be found chiefly under stones.

ANISOLABIS KUDAGÆ, sp. n.

Statura magna. Colore nigro, rubrescente ; antennæ fuscæ, basi atque apice rufo-annulatæ, 17-segmentatæ. Pronotum rectangulam, quam caput tam atque latum, postice paullo latius. Elytra nulla. Abdomen segment is minutissime punctulatis, tuberculis lateralibus minime impressis, vix vel haud distinguendis. Pedes fortiores. Abdomen apicem versus paullo dilatatum, apice ipso paullo attenuatum ; segmentum ultimum magnum, læve, medio impressum, quadratum. Forceps ♂ bracchiis basi valde distantibus, triquetris, fortibus, basi paullo dialatatis, valde incurvis, bracchio dextro quam sinistro fortius, superne sursum decussato. ♂. ♀ rectis subcontiguis, apice decussatis, margin interno denticulate ♂ ♀.

	♂	♀
Long. corporis.....	15·75 mm.	15 mm.
„ forcipis	3	3·5

Large ; colour shining-black, shading off into dark-red on the pronotum and abdomen.

HEAD shining-black ; antennæ with 17 segments ; the first and second red ; 15 and 16 inclining to lighter-reddish ; the remaining segments black. Mouth parts brown.

PRONOTUM square, slightly narrower anteriorly than posteriorly ; angles sharp, rectangular ; the sides slightly upturned, reddish ; about as broad as the head anteriorly ; posterior angles rounded ; there is a longitudinal impressed line which continues across the mesonotum. Mesonotum narrow with a median impressed line. Metanotum arched.

FEET stout, clothed with a few bristles, dark-fuscous, the tibiæ and tarsi paler, reddish.

ABDOMEN broadest at the sixth and seventh segments, black, with a red tinge the lateral tubercles extremely faint, barely distinguishable ; the segments are very finely punctulated. The last segment is not so broad and the

few immediately preceding smooth, with a median line, slightly broader than long, with a tubercular ridge at each side above the insertion of the forceps. Penultimate ventral segment completely covering the last, except at the angles, bluntly triangular, emarginate at the apex.

The FORCEPS, ♂, are stout, the branches, slightly dilated on the inner margin at the base with a blunt tooth-like tubercle above at the base, strongly incurved almost immediately, the apices crossing ; the right branch is much more strongly curved than the left, and crosses above it. Seen from the sides the forceps are pointed somewhat strongly upwards.

The ♀ resembles the ♂ in size and colour ; the abdomen also dilated and then attenuated posteriorly ; the branches of the forceps are subcontiguous, stout, straight, curved upwards and decussating at the apex, the inner margins denticulated. In the ♀ I can distinguish no signs of the lateral abdominal tubercles.

Habitat.—Hatton, Ceylon, July, 1897 (O. O. W.)

This species approaches to *A. maritima* and *A. mauritanica* is the somewhat dilated abdomen and in the form of the male forceps. The absence of a bifid pygidium, and the more strongly curved forceps distinguish it from *A. rufescens*, Kirb., which seems to be closely allied. It is a noticeable species and not likely to be confused with others that occur in the island. The impressed line down the mesonotum gives it at first the appearance of possessing rudimentary elytra, but as the line is a continuation of the line on the pronotum, it can be seen that elytra are entirely wanting.

ANISOLABIS ANNULIPES, Luc.

Medium sized, black shining. Head black ; antennæ with basal segment reddish, the rest greyish-brown, except the two penultimate segments which are whitish. Pronotum as broad as the head, sometimes paler in colour, quadrate ; elytra entirely absent. Abdomen with sides more or less parallel, with no tubercles upon the sides of the second and third segments. Last dorsal segment larger than the others, slightly impressed in the middle. Feet testaceous, the femora banded with black, as are also the tibiæ. The depth and intensity of this banding varies very considerably. Branches of the forceps in the ♂ remote at the base, stout, strongly incurved, the right branch crossing above the left at the apex ; in the ♀ the branches are straight, conical, subcontiguous.

Length of body ♂ 11mm..... ♀ 12-14 mm.

„ of forceps ♂ 2mm..... ♀ 3-3·5 mm.

Forficesila annulipes, Luc. 1847, Ann. Soc. ent. Fr. (2) V. Ball 84.

Anisolabis annulipes, Borm. 1900, Forf. 48. (q. v. for synonymy.)

Habitat.—This species is entirely cosmopolitan. From Ceylon I have received specimen from Mr. Green from Punduloya and from Hatton.

It is difficult to distinguish the various small species of *Anisolabis*, especially if only females and undeveloped specimens are to hand. *A. annu-*

lipes differs from *A. brunneri* in having the antennæ ringed with white, and the feet with black; in *A. brunneri* they are uniform in colour. A similar species is *A. Stali*, in which rudimentary elytra may be detected.

ANISOLABIS BRUNNERI, Dohrn.

Piceous, the head black; clypeus and labrum dark, the rest of the mouth parts and the antennæ basal segments ferruginous, the rest of the antennæ greyish-brown; pectus and feet dirty-testaceous; abdomen posteriorly very shortly attenuated.

Length of body 12 mm, of forceps 2 mm. ♀.

Forcinella brunneri, Dohrn., 1864, Stett. Ent. Zeit., xxv., 291.

Anisolabis brunneri, Borm. 1900, Forf. 48.

I have received from Mr. Green from Punduloya some females which M. de Bormans has identified, with doubt, with this species.

BRACHYLABIS, Dohrn.

Body cylindrical, convex punctate, more or less pubescent. Antennæ with from 9 to 15 segments, segment 2 smallest, 3 equal to the two following, all segments stout; pronotum elongate, broader behind than before, broader than the head. Mesonotum strongly depressed on each side, forming thus an angled keel. Elytra and wings entirely absent. Femora elongated, especially the posterior pair. Abdomen with lateral tubercles very distinct. Forceps, ♂, with branches short, slender, equally incurved unarmed; ♀ branches slender, straight, subcontiguous, decussating.

Brachylabis, Dohrn, 1864, Stett. Ent. Zeit., xxv., 292.

Borm., 1883, Ann. Soc. Ent. Belg., xxviii., 64.

This genus, as used by Dohrn, falls before the prior *Anisolabis*, but de Bormans retains it for *B. chilensis*, Blanch, which is the type *B. punctata*, Dubr., and *B. bifoveolata*, Bol. It differs from *Anisolabis* in the form of the forceps, abdomen, thorax and distinct lateral tubercles.

B. punctata is found widely distributed in the Oriental Region and will probably turn up in Ceylon.

BRACHYLABIS PHILETAS, sp. n.

(*Philetas*, a historic dwarf).

Parva, nigra, punctata. Antennæ breves, 9-segmentatæ, 1 longo, fusco, 2 oblongo rufescenti, 3-6 nigris brevibus, rotundatis, 7-8 majoribus, rotundatis, albis, 9 breviori, rotundato, nigro. Mesonotum medio profunde transverse impresso, abdomen forcipeque typico; pedes testacei, femoribus late nigro-vittatis, tibiis tarsisque testaceis, segmentum primum tarsorum duobus sequentibus unitis longius. ♂ ♀.

	♂	♀
Long. corporis	6 mm	7·5 mm.
„ forcipis	1·25	1

Size small; colour black, the whole body punctulate, with a few stiff hairs.

ANTENNÆ with 9 segments, black; No. 2 reddish, Nos. 7-8 white, the rest black segments 1 long, 2 shorter, the rest quite round, as broad as long, gradually; larger, the ninth a little smaller than the eighth, which is the largest.

PRONOTUM broader than the head, elongate, trapezoidal, the sides raised; mesonotum narrow, strongly impressed anteriorly, the posteriorly part being therefore slightly elevated, the sides are keeled and the anterior angle slightly broader than the pronotum; metanotum as broad as the mesonotum, and exposing only a small part of the first abdominal segment.

FEET long; tibiæ and tarsi testaceous; femora testaceous, with a strong broad black band; first tarsal segment longer than the second and third together; abdomen cylindrical, the lateral tubercles very distinct on the second and third segments; last segment very small in both sexes.

FORCEPS very short, slender; in the ♂ the branches, are remote at the base, slightly incurved, meeting at the apex, unarmed; ♀ subcontiguous, almost straight, crossing at the apex. ♂ ♀.

Habitat.—Punduloya, Ceylon, ♂ and ♀ in coitu (E. E. Green).

This little species is considerably smaller than *B. punctata*, from which it may be distinguished by its deeply impressed metanotum, much shorter and rounder antennal segments; it may be separated from *B. bifoveolata*, from Trichinopoly, by the presence of tubercles on the second as well as the third abdominal segments, by its smaller size, black banded femora, and shorter antennæ. The 9-segmentate antennæ with very small round segments are characteristic.

The extreme brevity of the antennæ led me at first to consider them mutilated, but Mr. Green writes that when freshly taken the "penultimate and antepenultimate" were white.

FORCIPULA, Bol.

Large insects. Abdomen with segments on each side tuberculate or spined; branches of the forceps very long, little shorter than the body, slender, smooth or finely denticulate, nearly straight, the apices crossing in the ♀, strongly incurved in the middle, then straight and parallel, then incurved at the apex, sometimes with a strong internal tooth in the male.

Forcipula, Bol., 1897, Ann. Soc. Ent. Fr., p. 283.

This genus which can be easily recognised by its form and the shape of the forceps, and especially by the tubercles or spines on its sides, included the large spiny earwigs previously referred to, *Labidura*, to which it is otherwise closely allied.

FORCIPULA QUADRISPINOSA, Dohrn.

Dark or castaneous; abdominal segments (in the ♂) Nos. 2-5 with strong lateral spines; forceps long, the branches distant at the base, gently curved, keeled above, flat beneath, denticulated on the inner margin, with a strong tooth in the middle, then attenuated, almost parallel, curved in at the apex. Head black or dark-brown; feet brown or yellowish, the ends of the

femora and the bases of the tibiæ darker, the tarsi and end of the tibiæ clear-yellow. The general colour of the upper surface varies from brownish-black to reddish-brown. Length of the body 15-18 mm., of the forceps 9-12 mm. ♂.

Habitat.—Eastern India; Tranquebar (Dohrn); Madras (Mus. Hope); Ceylon (Dohrn).

I have never seen specimens of the fine earwig from Ceylon. It should be sought for under stones in damp places.

Labidura quadrispinosa, Dohrn, 1863, Stett. Ent. Zeit., xxiv., 310.
Scudd., 1876, Ent. Notes, V.
Borm., 1882., Ann. Mus. Civ. Gen. (2), vi., 434, id. op. cit., 1894, xiv., 377.

Forcipula quadrispinosa, Bol., 1897., Ann. Soc. Ent. Fr., 283.
Borm. 1900, Forf. 30.

LABIA, Leach.

Size small. Body flattened, slender; antennæ with 10-15 segments, the segments conical; elytra well developed; wings usually well developed. First and third tarsal segments equal, the second very small, simple. Second and third abdominal segments with lateral tubercles; forceps usually short, slender, the branches remote at the base in the male, arcuate, horizontal, simple in the female, straight and crossing at the apex.

Labia, Leach, 1815, Edinb. Enc., ix., 118.

This genus may be generally recognised by its small size. A universally distributed and closely allied genus is *Spongophora*, Serv., they may be separated as follows.

Labia.—Antennæ with 10-15 segments, which are short, distinctly conical, that is to say, considerably larger at the apex than at the base. The first tarsal segment is slightly longer than the third, or equal to it; the second cylindrical and very short. Penultimate ventral segment ♂ rounded, *Spongophora.* Antennæ with at least 15 segments, these, except the fourth, short and conical, nearly cylindrical; first tarsal segment considerably longer than the third; the second cylindrical but slightly longer than in *Labia.* Penultimate ventral segment ♂ nearly rectangular (after de Bormans).

LABIA MUCRONATA, Stål.

Very small. General colour dark-brown. Head shining black. Antennæ yellowish, darker towards the apex, with 14 segments. Pronotum quadrate, narrower than the head, black, the sides paler, the angles rounded, slightly broader posteriorly than anteriorly. Elytra long, dark-brown, with a broad testaceous stripe on the outer margin from the shoulder to the apex. Wings varying in length, but projecting beyond the elytra, testaceous, with a broad dark stripe on the suture. Femora black, testaceous at the apex; tibix testaceous, black at the base; tarsi testaceous. Abdomen more or less dilated, shining black, or dark-brown; the last segment considerably narrowed. In the ♂ the pygidium is short, stout, triangular, obtuse, in the ♀ it is not noticeable.

The forceps of the ♂ have the branches very slender, yellow, straight, remote at the base, with a long sharp fine tooth or spine on the inner margin at the base, pointing downwards ; the branches are gently curved in to meet at the apex. In the ♀ the branches are contiguous, slender, straight, pale-yellow, slightly decussating at the apex.

Length of body.....3·75 mm. 5 mm.

„ of forceps .....1·25 1.

Forficula mucronata, Stål., 1860, Eugenies Resa, 303.

Labia mucronata, Dohrn, 1864, Stett. ent. Zeit., xxv., p. 423

Borm., 1888, Ann. Mus. Civ. Gen. (2), vi., 439, id., 1894, l. c., xiv., 386., id. 1900, Forf. 68.

Habitat.—Java (Stål). Philippines ; New Guinea (Dohrn) ; Burmah and Eastern India (Borm.).

In Ceylon, Colombo, 1·97, from decaying pod of *Poinciana*, 1 ♀, and Matale, in decaying cocoa pods, and crevices in the bark of cocoa trees, ♂ and ♀ (Green).

This pretty little species may be recognised by the sharp downward tooth or spine at the base of the forceps of the male. The colour of the forceps varies from pale-yellow to black. It appears to be common in Ceylon, and is abundant throughout the Oriental Region.

LABIA CURVICAUDA, Motsch.

Head black or dark-brown ; mouth parts paler ; antennæ brown, the tenth or eleventh segment whitish. Pronotum longer than broad, broader posteriorly than anteriorly, dark-brown, or by variety reddish in the anterior portion. Elytra and wings dark-brown, the latter not very prominent. Feet testaceous, the femora black at the base. Abdomen slightly dilated, dark reddish-brown, the last segment brighter, impressed in the middle, narrow, with a small tubercle above the insertion of the forceps on each side. Branches of the forceps ♂ remote at the base, where they are dilated, then strongly incurved and attenuated, meeting at the apex, forming a semicircle ; in the ♀ the branches are straight, contiguous, unarmed, the same colour as the abdomen, or reddish by variety.

Length of body ....♂ ♀ 5·5 mm.

„ of forceps .....♂ ♀ 1 mm.

Forfiscelia curvicauda, Motsch, 1863, Bul. Soc. Imp. Nat. Moscou, xxvi., Part 2, No iii., p. 2, Tab. II, Fig. 1. (♂)

Labia curvicauda, Dohrn., 1864, Stett. Ent. Zeit., xxv., 428.

Borm., id., 1900. Forf. 70. Ann. Mus. Civ. Gen. (2), vi., 440 ; id., l. c., xiv., 387.

Habitat—Ceylon, Mts. Nura Ellia, (Motsch.). Numerous in Burmah (Borm.) Western Java (coll. mea). Ceylon (Thwaites, in coll. Hope).

I possess a male of this species from Java, which differs slightly in colour from the type. It may be known by the semi-circular forceps of the male which recall the forceps of certain *Anisolabis*.

LABIA PILICORNIS, Motsch.

Reddish, antennæ and mouth parts greyish-yellow, feet yellowish; fourth segment of the antennæ much smaller than the following segments, oblong; pronotum longer than broad, hinder edge of last abdominal segment smooth; forceps straight, short, unarmed. ♀.

Length of body..... 4 mm.

„ of forceps..... 1 mm.

"Only a single female from Motschulsky's collection is known to me. It may be distinguished from *L. minor* L., by the following points: the pronotum is longer than broad, so that the hinder margin projects further over the basis of the elytral; the elytra and wings are shorter, but that may be merely an individual variation. The fourth antennal segment is distinctly smaller than the fifth." (Dohrn).

Forfiscelia pilicornis, Motsch., 1893, Bull. Soc. Imp. Nat. Moscou., xxvi.; No. III., p. 2.

Labia pilicornis, Dohrn., 1864, Stett. Ent. Zeit., xxv., 437.
Borm. 1900, Forf. 72.

Habitat in insule Ceylon montibus Nura Ellia dictis (Nietner).

This species is totally unknown to me, so I have given Dohrn's remarks word for word.

CHELISOCHES, Scudd.

Antennæ with at least 15 segments; the first is broadly conical, the second round, the third cylindrical, the fourth and fifth short, oblong; the following segments gradually oblong and conical. Pronotum scarcely as broad as the head, with hinder angles rounded. Elytra always, wings almost always, well developed. Abdomen with the sides parallel, the lateral tubercles well developed. The last segment is rectangular in the ♂, narrowed in the ♀. The penultimate ventral segment is large and covers the greater part of the last, rectangular, with rounded angles. Forceps flattened, the branches of ♂ remote at the base, more or less dilated, incurved, with varying teeth on the inner margin. In the ♀ the branches are subcontiguous, straight, crossing. Feet stout; the second tarsal segment short, with a long, pubescent lobe, produced beneath the third segment.

Lobophora, Serv., 1839, Orth., 32, Dohrn.

Chelisoches, Scudd., Borm. Kirb. Burr.

This genus is characterised by its antennæ and second tarsal segment.

The two species known to occur in Ceylon are not likely to be confused, being very different in appearance.

CHELISOCHES MORIO, Fabr.

Large, black, shining, glabrous. Head black; antennæ with at least 22 segments, black at the base; segments 15·16 white, the apical segments pale; the first few segments are short, then from the seventh they gradually lengthen, the apical segments being very long and slender. Pronotum slightly broader than the head, the hinder border rounded

and the anterior border straight. Elytra long, smooth, shining black sometimes with a bronze sheen, emarginate at the apex; wings prominent, the same colour as the elytra. Feet black, the tarsi reddish or testaceous, pubescent. Abdomen cylindrical, finely granulated, the lateral tubercles very distinct. Anal segment large, smooth, the hinder margin straight, tuberculated and folded, impressed in the middle. Forceps, ♂ with the branches remote at the base, stout, of two forms, either long with a jagged dilatation at the base on the inner margin, attenuate, straight, gently incurved to meet at the apex, with a strong tooth on the inner margin nearer to the apex than to the base, or else short, stout, dilated, crenulated inside at the base, strongly incurved, unarmed. In the ♂ the branches are slender, unarmed, gently incurved to meet at the apex, where they sometimes decussate. In the ♂ a pygidium is sometimes visible, short and obtuse; in the ♀ the pygidium is distinct, short, obtuse, truncate.

	♂	♀
Length of body	13·5-17 mm	17-22m.
„ of forceps	3-7	8

Forficula morio, Fabr., 1775, Syst. Ent., 270. Burm., 1839, Handb. II., 752.
Lobophora morio, Dohrn, 1865, Stett. Ent. Zeit., xxvi., 71.
Lobophora rufitarsis, Serv., 1839, Orth., 33.
Forficula (*Psalidophora*) *rufitarsis*, de Haan., 1842, Verh. Nat. Gesch. Ned Bezitt., Orth., 241.
Lobophora negronitens, Stål., 1858, Eug. Resa., 305.
L. tartarea, *L. cincticornis*, Stål., l. c.
Chelisoches morio, Scudd., 1876, Proc. Bost. Soc. N. H., xviii., 308, Borm. 1900, Forf. 85.

Habitat.—The Islands of the Pacific Ocean and also the neighbouring mainland. India, Mauritius, Pulo Penang, Java, Celebes, Luzon, Fiji, Tahiti, Owaihi, New Guinea, Roon, Batchian, Sumatra, Dorey.

In Ceylon, Dohrn., I have an immature specimen from Punduloya (Green). In the Hope Collection at Oxford there are numerous examples (Thwaites), and in the Brussels Museum there are many others. Dohrn, too, records it from Ceylon. It is distributed throughout the Oriental, and part of the Australian Regions. The two forms appear to be equally common, and these numerous gradations between them.

CHELISOCHES PULCHELLUS, Gerst.

Of small size; the general colour dark. The head is reddish, the eyes black; the antennæ have 13 segments (Gerstaecker), dark testaceous in colour, the first segment considerably paler. Pronotum straight in front, rounded behind, dark shining brown in colour, the sides paler. Elytra and wings perfectly developed; the former rich dark-brown in colour, with a bright testaceous oval spot at the shoulder; wings prominent, bright testaceous with the suture and apices dark-brown. Abdomen rich shining brown; the

last segment is large, with a lumpy tubercle above the base of the insertion of the branches of the forceps. Feet testaceous. Forceps in the ♂ dilated at the base and subcontiguous, then slender, gradually curved in, to meet at the apices; the dilated part is crenulated. In the ♀ the branches are straight and stout, subcontiguous throughout their length, flattened and unarmed. A small pygidium is visible in the ♀ when the branches of the forceps are opened outwards. ♂ ♀.

	♂	♀
Length of body.....	10mm.	8-8·5mm.
„ „ forceps.....	2·5mm.	2-2·5mm.

Chelisoches pulchella, Gerst, 1883, Beitr. Zur Kennt., Orth., Fauna Guineas, p. 42 (p. 4, in reprint).

Chelisoches pulchellus, Borm. 1900, Forf. 88.

Habitat.—Common at Abo in the Cameroons in December, and at Ogowe at Limbareni in May and June, in West Africa. In Ceylon, apparently fairly common at Punduloya, in February, and at Ambegammoa (Green).

This pretty species has hitherto only been known from West Africa, where Buchholz discovered it in some numbers. Mr. Green has sent me several examples taken in bungalows, and one from an empty gall on *Antidesma*. Its occurrence at two such widely separated localities is very interesting, and may be compared with *Diplatys macrocephala* (Beauv), which is found in West Africa and again in Burmah, or with *Anisolabis læta*, which occurs at Zanzibar and also in Burmah. Further collecting may turn these species up in some connecting locality, or they may continue to be a problem in discontinuous distribution.

Ch. pulchella may be recognised by its dark-brown colour, with four pale spots on the elytra and wings, and also by the form of the forceps of the male, which resemble the forceps in shape of the common European *Forficula auricularia*.

CARCINOPHORA, Scudd.

Shining black. Pronotum somewhat narrower than the head; antennæ with 13 segments. Elytra free, well developed, truncated posteriorly, wings absent; abdomen stout, lateral tubercles very indistinct, barely visible, or entirely absent. Forceps simple, short, conical, slightly curved in at the apex.

Carcinophora, Scudd., 1876, Proc. Bost. Soc. N. H., xviii., 291.
Borm. 1900, Forf. 40.

This species is practically an *Anisolabis* with free elytra, or *Psalis*, without wings.

CARCINOPHORA DOHRNI, Kirb.

Medium sized, bright shining black, the abdomen more or less reddish The head a little broader than the pronotum, shining black, the eyes paler; the antennæ have at least 13 segments, probably more. (Dubrony suggests

18); the first three segments are pale, the rest black except the two penultimate segments which are pale. The pronotum is straight in front, rounded behind, shining black, except the sides which are somewhat paler. The scutellum is very small and difficult to distinguish. The elytra are perfectly developed, shining brown, with more or less strongly developed purple or blue metallic sheen, which is variable, and sometimes barely distinguishable. They are longer than the pronotum, truncated at the apex. Wings absent. The feet are pale-testaceous, the femora strongly banded with black. The abdomen is very slightly dilated, black, or blackish-brown, occasionally even dark-red, bright-shining, clothed with a few bristles, the folds of the second and third segments are absent or very faintly developed. The abdomen is paler beneath; the last segment is somewhat narrower than the others, square. The forceps have the branches stout, almost contiguous at the base, cultriform, finely denticulated on the inner margin, nearly straight, but curved in towards the tip, the right branch more strongly curved than the left. In the ♀ the branches are stout, contiguous, decussating at the apex.

Length of body.....♂ ♀ 10-12 mm.

„ of forceps ♂ ♀ 2-2·5 mm.

Nannopygia dohrni, Kirb., 1890, Linn. Soc. Journ. Zool., xxiii., 508.

Labidura femoralis, Dubr., 1879, Ann. Mus. Civ. Gen., xiv., 353. (nec Dohrn).

Carcinophora cœruleipennis, Borm., 1900, Forf. 40.

Habitat.—Ceylon (Kirb., Brit. Mus.); Galle, Ceylon (Dubr.); Ceylon (Thwaites, in Mus. Hope, ex coll., Westw.); Kandy (Simon, in coll., Bolivar).

C. castetsi, Bol., from Southern India is not very different in appearance; the branches of the forceps are more slender and strongly curved, and the body is more dilated.

This species does not appear to be rare in Ceylon, but I have received no specimens from Mr. Green. In the Hope Collection at Oxford there are nine specimens, from Westwood's Collection, captured by Thwaites. Thanks to the kindness of Senor Bolivar, I have been able to examine two females in his collection, determined by M. de Bormans as *Carcinophora cœruleipennis* (Borm.).

APTERYGIDA, Westw.

Medium sized insects, or small. Antennæ with 10-14 segments; pronotum narrower than the head. Elytra well developed; wings well developed or abortive. Abdomen with lateral tubercles developed. Penultimate ventral segment with semi-circular border, almost (♂) or entirely (♀) covering the salt. Forceps ♂ with branches remote at the base, slender, incurved to meet at the apex, with varying teeth on the inner margin. In the ♀ contiguous, slender, more or less flattened.

Apterygida, Westw. 1839, Introd., Mod. Class. Ins., 1, 42.
Borm. 1900, Forf. 109.

Forficula, Dohrn.

Sphingolabis, de Bormans, auctt.

Chelidura (partim), Brunner.

This genus can only be distinguished by the shape of the ♂ forceps from *Forficula*, the typical genus of the group. In *Forficula* the forceps have the branches strongly flattened and dilated at the base, and then slender and converging.

I have given my reasons* for retaining Westwood's names.

1. Size small. Elytra dark-coloured. Forceps short (simple in ♀). (Wings abortive) .....1. *ARACHIDIS*, Yers.

1·1. Size medium. Elytra golden-yellow. Forceps long .....

2. Wings developed. Forceps ♀ with no tooth. Lateral folds well developed .....2. *BIPARTITA*, Kirb.

2·2. Wings abortive. Forceps ♀ with a blunt tooth near the apex, lateral folds faint .....3. *CINGALENSIS*, Dohrn.

APTERYGIDA ARACHIDIS (Yers.).

Dark-brown or castaneous, hairless. Antennæ with 12-13 segments. Pronotum squared, with the lateral margins paler, and the posterior margin straight. Elytra free, black or reddish, the hinder margins truncate. Wings abortive. Feet testaceous. Femora sometimes with a blackish band near the base. Abdomen glabrous, each segment with a very short pubescence at the hinder margin, segments 5 to 8 in the ♂ and sometimes also the forceps, slightly punctulated. In the ♂ the anal segment is subquadrate, impressed in the middle, with no tubercles; the forceps have the branches remote at the base, short, slender, cylindrical, gently incurved with a very small tooth on the inner margin at the base itself, and another in the apical third. In the ♀ the anal segment is the same as in the male; the branches of the forceps are short, curved in towards the apex.

	♂	♀
Length of body.....	8 mm.	
„ of forceps ...	2-2·5	1·75

Forficula arachidis, Yersin, 1860., Ann. Soc. Ent. Fr., III., S. VIII., p. 509. Tab. 10, fig. 33-35.

Forfiscelia nigripennis, Motsch., 1863, Bull. Soc. Imp. Nat. Moscou., XXXVI., No. 3, p. 1.

Forficula nigripennis, Dohrn., 1865, Stett. Ent. Zeit., xxvi., p. 89.

Scudd., 1876, Proc. Bost. Soc. N. H , xviii., 315. Ent. Notes, V., 55 (1876).

Forficula wallacei, Dohrn., 1865, 1, c. p., 88.

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* Ann. Mag. N. H. (7), vol. iv., 255, 1899.

Scudd., 1876, 1, c., 318, Ent. Notes, V., 58.
Sphingolabis wallacei, Borm., 1888, Ann. Mus. Civ. Gen. (2), vi., p. 448.
Forficula (*Apterygida*) *gravidula*, Gerst., 1869, Arch., f. Nat., xxxv., i., 221.
——— 1873, Glied-Fauna. Sans., 50, pl. 3, fig. 9.
Spingolabis gravidula, Borm., 1894, Ann. Mus. Civ. Gen. (2), xiv., 407.
Forficula arachidis, Scudd., 1876, P. c., 311., Ent. Notes., V., 51.
Chelidura arachidis, Brunner, 1882, Prod. Eur., Orth., 21.
Sphingolabis arachidis, Borm., 1893, Biol. Cent. Amer., Orth., 12.
——— 1894, Ann. Mus. Civ. Gen. (2), xiv., 406.
Apterygida arachidis, Burr., 1897, Brit., Orth., 17, pl. I., fig. 8, Walker, 1897, Ent. Mo. Mag. (2), viii., 132.
Borm. 1900, Forf. 117.
Apterygida gravidula, Borm., 1900, Forf. 117.

Habitat.—Ceylon (Thwaites, in coll. Hope). Montibus Nura Ellia (Motsch.); New Guinea (Dohrn), Marseilles in pea-nuts (Yersin), Queenboro', in Kent, among old bones (Walker Burr.,), Mombasa (Gerst.), Burmah, Phillipines, Aru Islands, North Australia, Madagascar, Java, Sumatra, New South Wales, Mexico, Porto Rico, Cuba (Borm.).

This species is entirely cosmopolitan, and occurs in all ports almost throughout the world. In temperate climates it appears only to be able to live under conditions of artificial heat, and so is probably of tropical origin. It seems to be extremely numerous everywhere. The synonymy has been established by de Bormans. In his later work (1900) de Bormans separates *A. arachidis* and *A. gravidula*.

APTERYGIDA BIPARTITA (Kirb.).

Slender, elongate. Head shining, red; eyes black; antennæ darkish-testaceous, with 12 segments. Pronotum slightly narrower than the head, and of the same colour, sometimes varied with testaceous. Elytra long, golden-yellow, with a darker band on the suture and outer border. Wings projecting well beyond the elytra, and of the same colour. Feet pale, testaceous. Abdomen of a rich dark-red, shining, all the segments, and to a less extent, the forceps also, finely and densely punctulated; the glandular folds of the second and third segments are very distinct and black. The anal segment is narrow, impressed in the middle, the angles sharp. The forceps in the ♂ are dimorphic; the branches are slender, wide apart and straight with a flattened triangular dilatation in the form of a tooth at the base on the inner margin; after that they are simple and unarmed; in one form they are short, and straight, very slightly incurved at the apex, where they scarcely meet; in the other form they are much longer, and the apices meet, and are more or less strongly curved upwards. In the ♀ the branches are stouter, contiguous, straight, conical, and unarmed.

	♂	♀
Length of body	9·75-10·75 mm.	8·75-9 mm.
„ of forceps	3-6	2·25

Sphingolabis bipartita, Kirb.. 1890, Linn. Soc. Journ. Zool., xxiii., p. 526.

Habitat.—North India (Kirby); Ceylon, Punduloya, caught in a bungalow, x, 97. ♂ (type form), and ♀ attracted by light. The same, iv., viii., ix., 97, attracted by light. Second form of ♂ less commonly, viii. 97. ♀♀ at Punduloya, v. and vi., 97 (dark variety).

This very pretty species seems to be fairly common in the neighbourhood of Punduloya. Of the two forms of the male, the type form, with long forceps, appears to be the commonest. The forceps of the second form, with the basal dilatation, approach more nearly to the typical *Forficula*, and represented an intermediate stage between such forceps as those of *F. escherichi*, Kr., and the typical *A. bipartita*, Kirb. That the form of the forceps of the male is the only means of separating *Forficula* and *Apterygida* is extremely unfortunate, and upon seeing only the second form of the male of this species, it would be purely a matter of opinion in which genus to range it. The forceps of the type form recalls certain Neotropical species of the genus.

In the type form, the anal abdominal segment is less completely punctulated, and brighter in colour than in the second form.

To a male of the type form Mr. Green has attached the following note—"Glandular folds strongly developed; the insect when handled gave off a pungent odour, like that of the Bombardier Beetle."

APTERYGIDA CINGALENSIS (Dohrn).

Golden-yellow, the abdomen less brilliantly coloured; the prothorax and elytra posteriorly dilated, with the sides not deflexed; forceps almost straight, the branches remote at the base, with an obsolete tooth on the inner margin beyond the middle. ♀.

Long. 8½., lat. 2½., forc. long. 3½ mill.

In Berlin Museum ♀ and Ceylon (Nietner).

Head arched, without impressed lines, shining; the antennæ are 15-segmentate, yellow. Hinder margin of the head in the middle slightly emarginate. Pronotum anteriorly narrower as broad as the lead, posteriorly broadened, the sides not turned, transparent horn colour; hinder border round, shining, smooth. Elytra scarcely longer than the prothorax, slightly broadened posteriorly, the hinder border rounded, smooth and shining like the head and prothorax. Abdomen posteriorly slightly narrowed, the tubercles of the second and third segments very small, the last dorsal segment fairly large, with a central line, the penultimate ventral segment entirely covering the ultimate. Branches of the forceps slightly caniculate (*getrennt*), at the base nearly straight, incurved at the apex, with a blunt tooth on the inside beyond the middle. Abdomen and forceps reddish-brown, pubescent. Sternum yellow; feet, like the head, fairly long, the femora and tibiæ slightly, the tarsi strongly pubescent; the first and third tarsal segment of the same length, the second very short, barely lobed.

Forficula cingalensis, Dohrn., 1865, Stett. Ent. Zeit., xxvi., 89.
Borm., 1900, Forf. 128.

This species is totally unknown to me, and so I give Dohrn's description in detail. Dohrn includes it in his section of *Forficula*, which corresponds to *Apterygida*, but until the male is discovered it is impossible to locate its position with accuracy; the most noticeable points in the description are the form of the forceps, (♀), the pronotum and elytra more or less dilated posteriorly, the absence of wings, and the small size of the glandular folds.

OPISTHOCOSMIA, Dohrn.

Small or medium-sized insects; body convex, not greatly flattened. Antennæ, with the exception of the first, which is long and conical, and the second, which is short, with long cylindrical segments. Pronotum considerably narrower than the head, quadrate. Elytra well developed, projecting well beyond the pronotum at the rounded shoulders. Wings usually well developed. Abdomen, more or less dilated in the middle, attenuated posteriorly; last abdominal segment small. In the ♂ the forceps are long, slender, more or less complicated, twisted into various directions, armed variously with teeth; in the ♀ the branches are slender, straight and subcontiguous. Legs long and slender; first tarsal segment slightly longer than the third. the second short and lobed.

Opisthocosmia, Dohrn., 1865, Stett. Ent. Zeit., xxvi., 76, Dorm., Kirb.

This genus distinguished easily, by the long cylindrical antennal segments, the slender legs, the broad shoulders of the elytra, and by the slender forceps, which are of remarkable shapes in the male.

Table of Species.

1. More or less stout insects; forceps comparatively stout; general colour dark-brown, varied with red..... 1. HUMERALIS, Kirb.

1·1. Smaller and slender insects; forceps very slender; colour testaceous.....

2. Wings perfectly developed.....

3. Abdomen unarmed. Forceps ♂ with one tooth (sometimes obsolete), and no basal tubercle... 2. SIMPLEX, Borm.

3·3. Penultimate abdominal segment toothed. Forceps ♂ with two teeth on each branch, and a basal tubercle above... 3. CEYLONICA, Motsch.

2·2. Wings abortive ..... 4. NEOLOBOPHOROIDES, n.

OPISTHOCOSMIA HUMERALIS, Kirb.

Glabrous, shining. Head red, the eyes greyish-black, antennæ with 11 segments dark, except the first which is pale. Pronotum, elytra and wings fuscous, with the lateral margins of the pronotum, an oval spot on the elytra

and a large round basal spot on wings, yellow; feet and forceps testaceous; abdomen castaneous. Forceps of the ♂ with the branches stout, remote at the base, gently arched outwards for the first third of their length, dilated on the inside, rounded; then more slender, depressed, curved in an oval for the second third of their length, with a sharp tooth on the inner margin, the tooth being triangular and horizontal; beyond this the points are sharp and decussate. The basal third is horizontal, the remainder slightly pointing upwards.

	♂
Length of body.....	9-10 mm.
„ of forceps	3 mm.

Opisthocosmia humeralis, Kirb., 1890, Linn. Soc. Journ. Zool., XXIII, 523 (♀).

Borm., 1894, Ann. Mus. Civ. Gen. (2), XIV, 400, (♂). id., 1900, Forf. 95.

Habitat.—Ceylon. (Kirb., Mus. Hope); Palon in Pegu, Burmah (Borm.) Easily recognisable by its form and colour.

OPISTHOCOSMIA SIMPLEX, Borm.

Darkish-chesnut, glabrous, shining. Head reddish or testaceous; antennæ 12-segmentate, brown, the 8, 9 or 10 sometimes paler. Pronotum brown, as broad as the head, nearly semi-circular, anterior border straight, posterior border rounded, convex in the middle, the sides flat and transparent. Elytra reddish-brown, smooth, considerably broader than the pronotum at the shoulders, which are well rounded, narrowed towards the apex, and truncated there. Wings projecting well beyond the elytra, of the same colour, with a pale-testaceous spot at the base on the outer border (sometimes absent by variety), and at the apex, on the inner margin, at the suture, a very small yellow spot. Feet slender, clear brownish-yellow. Abdomen brown, smooth, oval, elongated, and dilated in the middle, last dorsal segment trapezoidal, twice as broad at the base as at the apex, smooth, slanting downwards, the sides always smooth in the ♀, sometimes finely denticulated in the ♂. Pygidium not visible. Branches of the forceps in the ♂ clear brown, rounded, nearly contiguous at the base, then curved upwards, compressed and touching in the basal third, then horizontal and faintly diverging towards the points, which are incurved and cross; outside they are faintly bisinuate, very finely denticulate on the inner margin, with a horizontal internal tooth near the apex (almost obsolete in some specimens); in the ♂ the branches are shorter, unarmed, nearly straight, and subcontiguous attenuated at the apex, where they cross.

Length of body.....11-115 mm., ♂ ♀.

„ of forceps ♂ 5·5 mm., ♀ 4·5.

Opisthocosmia simplex, Borm., 1894, Ann. Mus. Civ. Gen. (2), xiv, 396. id. 1900, Forf. 98.

Habitat.—Burmah (Borm.); Ceylon, one mutilated female (Thwaites, in coll. Hope).

I include this species on the list on the strength of a female in very bad condition in the Hope Collection. I refer it to this species, which is otherwise unknown to me. It may be a variety of *O. dux*, Borm., also from Burmah.

OPISTHOCOSMIA CEYLONICA (Motsch.)

Small, slender, brown. Antennæ 12-segmentate, brown. Pronotum narrower than the head, hinder border rounded, anterior border straight, the sides strongly turned, shining brown. Elytra twice as long as the pronotum, uniform brown, truncate at the apex. Wings projecting well beyond the elytra, brown, with a faint yellow spot on the outer side at the basis and at the apex at the suture. Abdomen darker-brown, the glandular folds very prominent, black. In the ♂ the antepenultimate segment is armed on each side with a short tooth, the penultimate and ultimate segments are narrowed, the latter with a deep impression in the middle, the penultimate ventral segment semi-circular, covering only half the last segment. The forceps are long, with the branches contiguous at the base, parallel, then curved moderately outwards, incurved to meet at the apex, flat beneath, above with a long narrow, crest-shaped lump near the base, in the middle with two teeth, the first fairly long, the second shorter. In the ♀ the abdomen is simple, narrowed posteriorly, unarmed, the penultimate ventral segment as in the male, the forceps with the branches slender, straight, contiguous, crossing at the apex. The sternum and feet are paler than the abdomen, the latter very long and slender, the first tarsal segment as long as the third. The whole body is shining, only the antennæ, feet, underside of the body, and the forceps of the ♂ pubescent.

	♂	♀
Length of body.....	7·5 mm.	7·5-8 mm.
„ of forceps.....	5	2·25-2·5.

Labia ceylonica, Motsch, 1863, Bull. Soc. Imp. Nat. Moscou, xxxvi, part 2, No. 3, p. 4.

Opisthocosmia ceylonica, Dohrn., 1865, Stett. Ent. Zeit, xxvi, 83.

Borm. 1900. Forf. 96.

Habitat.—Ceylon (Dohrn, Mus. Berol); Punduloya, 4 ♀ ♀ (Green), x., 97, caught in bungalow, attracted to light, and iii., 98, in bamboo.

I only know the female of this species, and so have taken the description of the male from Dohrn. It may be recognised by its slender, graceful form, shining brown colour and well developed wings, as well as by the form of the forceps of the male and the abdominal tooth.

OPISTHOCOSMIA NEOLOBOPHOROIDES, sp.n.

Parva, glabra, fusca, nitida; caput suturis nullis; antennæ fuscæ, 12 segmentatæ. Pronotum capite angustius, quadratum; elytris brevibus, apice truncatis; alis nullis. Abdomen medio dilatatum, apice attenuatum tuberculis lateralibus perspicuis; forceps ♂ bracchiis basi contiguis, paullo deplanatis, dehinc curvatis, primum extus, deinde intus orbem ovalem

formantibus, apice attingentibus, gracilibus, inermibus, margine interno minutissime crenulatis; ♀ rectis, gracilibus, contiguis, inermibus, apice decussatis. ♂ ♀.

	♂	♀
Long. corporis	.....7·25 mm.	8 mm.
„ forcipis	.....4·35	3

HEAD shining brown, eyes black; antennæ with 12 long segments, Nos. 3 and 2 very slightly shorter than the others.

PRONOTUM narrower than the head, square, the angles rounded, the sides slightly turned, brown, the sides paler.

THE ELYTRA are short and square, brown, truncated at the apex. Wings absent.

ABDOMEN slender, dilated in the middle, the glandular folds very distinct; dark-brown, the folds still darker; from the sixth segment strongly attenuated, the last dorsal segment narrower, more so at the apexthan at the base, with a faint median impression, the hinder border straight with a tubercle above the insertion of the forceps on each side, more strongly in the ♂ than in the ♀.

FEET very slender and long, dark-testaceous, very faintly pubescent, the tarsi more strongly so; the first tarsal segment is as long as the third; the second short, very distinctly lobed.

FORCEPS of the ♂ with the branches subcontiguous at the base itself, then slightly flattened and contiguous, then suddenly strongly arched outwards, very slender, gradually incurved to meet at the apex; on the inner margin of this oval enclosed part there are a few faint crenulations. In the ♀ the branches are simple, straight, unarmed, slender, contiguous throughout their length, crossing at the apex.

Habitat.—Ceylon, Hatton, vii., 97 (O.S.W.)

I received a male and a female of this species from Mr. Green. It is to be distinguished from *O. ceylonica* by the form of the forceps of the ♂, by the much shorter and truncate elytra and absence of wings by the square pronotum absence of the abdominal tooth of the male, shorter and stouter legs.

It approaches very nearly to *Neolobophora tamul*, but may be distinguished by the free elytra; the forceps are almost exactly the same shape. I cannot distinguish a clear scutellum between the elytra at the base, but the species may have to be removed, when better known, to *Neolobophora*.

It appears to be allied to *O.* (?) *dubia*, Borm., from Burma, but differs in the colour of the head, femora and the form of the elytra, which are narrower at the base than at the apex, which are scarcely broader than the pronotum at the shoulders. In *O. dubia* the elytra are considerably broader than the pronotum and have the sides parallel. From their shape, in this species, the sides are slightly diverging.

AIDS TO THE DIFFERENTIATION OF SNAKES.

By Capt. F. WALL, I.M.S.

(*Read before the Bombay Natural History Society on* 18*th February* 1902.)

The most important factor in popularising and thereby advancing a subject lies in simplifying it, so that the veriest novice may grasp it with ease instead of suffering discouragement at the threshold of his enquiries, as is so often the case. I have frequently, in India, seen a man bring some natural history object to identify which has aroused his interest. He borrows a book, but though he knows the creature is probably described therein, he is at a loss to know where to begin his search. He discovers a key, however, and gaily sets to work. Sooner or later, he is frequently confronted with some unintelligible technicality, or what is worse, finds that he has to unravel some detail which perhaps only a careful and skilful dissection, or the preparation of a skeleton, will elucidate. At such a point his enquiries must, in many cases, come to a dead-lock, and it is not surprising that he throws down the book disgusted and has to resign himself to a further term of ignorance till, perhaps, some friend (not always forthcoming) can give him the information he requires and help him through the intricacies of identification.

There are scores of men in India with a bent towards natural history in some branch or another, many of whom have abundant leisure and abundant opportunities for observation, and who would welcome a hobby that would relieve camp life of some of its solitude and monotony, and introduce an interest throughout many a wearisome journey in the district. Many of these men have made an attempt to acquire information, and have been baffled in their early endeavours owing to the unsatisfactory and complicated nature of some key.

Many authors, while elaborating the descriptive parts of a work, frustrate the object of that work in great measure by bestowing far too little attention to the compiling of the keys, which are really the essential part, since it is by these that identification is rendered feasible or otherwise. The book which can afford the surest and most lucid guides to identification is the book that will command the largest sale and produce the most far-reaching and useful results, and it is such a work that so many men feel the want of. If the keys are to be made of real utility, they should be simplified, firstly, by purging them of all technicalities, or, where this is impossible, explaining them by diagrams in *all* cases. Secondly, by discarding reference to points which can only be elucidated by investigating anatomical peculiarities, substituting those observed in external characters alone, and always selecting those that can be most easily appreciated and put into practice. Such considerations as the plumage of the nestling in birds, the hypapophyses of vertebræ in snakes, &c., &c., though of interest and utility to the comparative anatomist, can have little, if any, practicable value to the generality of knowledge-seeking individuals, and the mere fact that such abstruse and occult differences are incorporated in the keys, leads one to infer that there is no

better means of differentiation in such cases, and that could simpler methods be discovered from external characters alone, these would be welcome and employed in preference ; but one has only to know a little of natural history matters to realise that to discover such means is much more easily said than done. It is with this object in view that I have been persuaded in this paper to endeavour to simplify the means at our disposal of differentiating between snakes, hoping that the results of my observations may be of use to those who, by reason of their access to large and fully representative collections, have it in their power to compile works—a possibility forbidden to one in my position who only sees at most a limited number of species and genera.

Many of the points I have made reference to may be found of doubtful utility in some genera, but the same may be said of all scales, and this should not detract from their value in others. Even such important scales in diagnosis, as labials for instance, have not an equal value in all genera. In *Bungarus* and *Naia* I have never yet seen one departure from the normal, whereas in *Chrysopelea* and many *Tropidonotus*, &c., these are not infrequent, and in many *Hydrophinæ* these scales are particularly unreliable owing to their inconstancy. Similar instances may be cited with reference to almost every scale.

I have adopted the nomenclature in usage in Boulenger's work, "Fauna of British India"—"Reptilia and Batrachia."

The Dorsals.

These scales are perhaps the most useful of all guides in enabling us to differentiate between species and genera, but authors have not availed themselves of their full value. It is usual for them to record the number of the rows in the middle of the body and at this point only, but observation has revealed to me that information as valuable is to be obtained by counting the rows in other situations as well. The rows which can be counted from the ventrals on one side over the back to the ventrals on the opposite side in far the majority of snakes total in the aggregate an odd number. In the neck these are more numerous than in the body, and these rapidly decrease, so that very shortly after the neck they dwindle to a definite and constant number in like species, though it may be very different in different species. This number once established is retained for a variable distance in the length of the snake. As far as my observations serve me, the number is preserved to a point at least well behind the middle of the body (not including the tail, which begins at the vent), after which the arrangement differs according to the species. In many cases the number peculiar to the species is preserved in the whole length of the body. On the other hand, in many other snakes the number peculiar to the species once established remains so to a somewhat variable point behind the middle of the body, after which, by the absorption of a row on each side, the number is diminished by two, which number remains constant to the vent, or in some cases a second or third absorption of rows may occur before the vent. These steps occur at intervals which are

quite as constant in like species as the number of rows in the middle of the body. (The method of absorption, though fairly constant, does not seem to me to be sufficiently so to merit special attention. In *Zamenis mucosus* and *korros* the second and third rows from the ventrals are the ones to fuse usually at each step. In many *Simotes* the fourth and fifth become blended, &c., &c.) About the region of the vent the numbers of rows dwindles rapidly and inconsistently. In order to avoid conflicting results, I count the rows in three situations :—(1) at a spot one head's length behind the head ; (2) midbody ; (3) one head's length in front of the vent. The value of the results derived from points (1) and (3) is quite equal to that at point (2), and, when the three are taken together, the value of the information acquired is augmented threefold.

The number is the same in all three localities in some snakes, such as *Bungarus, Callophis, Oligodon, Hydrophobus, Amblycephalus, Xenopeltis*, &c., &c. In other snakes the number in site (1) is greater than at site (2) as in *Naia*. Again, in other snakes the number at site (3) is less than at site (2). When this occurs, it is usually less by two only, as in *Psammodynastes, Lycodon*, &c. ; by three in one instance at least, *vis.*, *Zamenis mucosus*, where the original odd number 17 falls to an even one 14 ; by four rows as in many *Simotes, Psammophis condanarus, Chrysopelea*, &c., and by more than four in *Tropidonotus plumbicolor, Naia tripudians, Vipera*, and many *Trimeresurus*. In some snakes, again, the numbers are nowhere quite constant in the same specimen, not even in the middle of the body as in *Coluber oxycephalus* and many *Trimeresurus*, &c. It seems probable from my notes on many hundreds of specimens, that these peculiarities are of generic importance and, if so, such closely resembling genera as *Oligodon* and *Simotes* or *Hydrophobus* and *Lycodon* can be separated with ease and certainty.

THE SUPRACAUDALS.

In speaking of the dorsals I pointed out that the rows of scales were generally in *odd* numbers, and also made an allusion to the rapid diminution of rows about the supraanal region. The rows at this site are very variable, but close to the base of the tail arrange themselves in *even* numbers. As the tail attenuates, these rows diminish by the absorption of two rows (one on each side) at certain steps, the even numbers being retained throughout. The absorption at each step is affected by a fusion of the two rows nearest the median line on each side (and is different in this respect from the supracaudals of many lizards I have examined where rows nearer to the subcaudals blend). There are exceptions to this rule. In all the many *Bungarus* I have examined, the supracaudals arrange themselves in an odd series of rows to the tip of the tail, and I have also found a similar peculiarity in the very few specimens of *Calamaria* I have seen.

Another important character referable to the supracaudals lies in the fact that in nearly all snakes which have the vertebrals enlarged on the body, such as *Dipsas, Dendrophis*, &c., this peculiarity ceases in the supraanal

region, and the supracaudals behave as is the rule with other snakes, and which I have just mentioned. In *Bungarus*, however, the enlarged and hexagonal characters of the vertebral row are preserved in the median row of the supracaudals, subject to some modification in size at the various steps where blending occurs.

Keels.

The carination of scales is so capricious in the same specimen, though fairly constant in like species, that it deserves far more mention than has been conceded to it. Such remarks as "keels present" or "absent" have little weight unless these remarks are qualified. In some snakes they are present on every scale from the parietals to the tip of the tail (excepting perhaps a few in the forepart of the ultimate row), as in *Ancistrodon himalayanus*, *Cerberus*, *Echis*, &c.; in others they cease before the supracaudals have dwindled to two rows as in *Tropidonotus piscator* and *stolatus*, and in others they cease before the fours are established as in *Trimeresurus gramineus*, &c. In others they disappear before the sixes as in *Zamenis mucosus* and *korros*. The numbers of rows that are keeled should be recorded in all the three sites where scales are counted (see above). Before deciding whether keels are present or absent, the supraanal region is *the* part to be specially examined. Often scales are keeled here where they are smooth elsewhere as in *Dryophis*, where the median rows are specially so distinguished, and in *Hypsirhina plumbea* and some *Aspidura*, where the lateral rows exhibit this character. In all cases where faint keels are present these are most apparent in the supraanal region.

The Rostral.

Such expressions as "visible from above" are not precise, since all rostrals are more or less visible from above and the degree of visibility is subject to some variation. It is better to compare the portion visible from above with the scale or suture in the median line immediately behind it. Thus it is often twice as long as the suture between the internasals, as in many *Simotes* and *Oligodon*, often about equal to that suture, as in *Xenopeltis*, &c., and often half or less, as in *Ancistrodon*. The number of sutures it makes with adjacent scales should be mentioned. In a key such a remark as "rostral in contact with four scales" is easily grasped and as easily investigated. These sutures may be four only, as in the majority of the *Hydrophiinæ* (except the genus *Platurus*), *Xenopeltis* and many *Uropeltidæ;* five as in *Typhlopidæ*, *Helicops*, *Gerardia*, *Fordonia*, and *Hipistes;* six, as is the rule, such as in *Zamenis* and *Dipsas;* and rarely eight, as in *Simotes splendidus*.

Another point is the relative length of these sutures. When they are six, which is usually the case, the nasal is usually the largest as in many *Bungarus*, *Zamenis*, &c. In some snakes this suture may be twice that of the internasals, or more, as in *Dryophis*, *Ancistrodon himalayanus*, and *Vipera russellii*. Sometimes the internasal and nasal sutures are sub-equal, and this

is usually so in the genus *Simotes*. In other cases the internasal suture is decidedly larger than the nasal, constituting a generic distinction in *Naia*. The first labial suture is usually the smallest; however, in some *Psammophis* and *Tropidonotus* it is larger than the internasals, and in the genus *Platurus* is the largest of the six sutures.

INTERNASALS.

It is more precise to compare the suture between the two fellows in the median line with the suture each forms with the præfrontal than to compare the length of these scales with their breadth, for, laterally, they are reflected on to the face to a variable degree, and, again, as the snout narrows anteriorly, the breadth is not consistent throughout. In the same way the suture between the præfrontal fellows should be compared with the suture each makes with the frontal.

The variations in the sutures arising between these four scales are of some value in differentiation. As a rule, the length of the suture between the two internasals is less than the suture each makes with the præfrontal, and the length of the suture between the præfrontals is greater than the suture each makes with the frontal, as is seen in many *Callophis*, *Lycodon*, *Naia*, &c. In *Simotes* and *Amblycephalus*, however, the suture between the internasals is about half that made with the præfrontals; and the suture between the præfrontals, half that made with the frontal. In *Tropidonotus*, as a rule, the suture between the internasals is sub-equal to that made with the præfrontals, and the suture between the præfrontals sub-equal to that made with the frontal. One instance may be mentioned where these measurements will separate species. In *Dryophis mycterizans* the suture between the internasal is about twice that made with the præfrontals, whereas in *Dryophis prasinus* these sutures are about equal. In both the suture between the præfrontals is about twice that made with the frontal. My notes in other cases seem to point to similar differences in some species, but one requires so many of a kind before laying down a rule that I hesitate before giving other examples.

Again, with regard to the præfrontal, its relations on its anterior, external and posterior aspects are of such variability and importance in different genera and species that it is the most important scale on the head for diagnostic purposes.

Anteriorly when internasal scales are present they are always in contact with the præfrontals, but when absent, this relationship may be substituted by the rostral, as in *Calamaria*, or more commonly the nasals, as in the family *Hydrophiinæ* (except the genus *Platurus*), &c.

Externally (1) *the nasals* meet the præfrontals in the vast majority of species, but there are exceptions. (*a*) In *Naia tripudians* and *Hypsirhina enhydris* a departure from the above is brought about by a meeting between the præocular and internasals, and is a useful feature in separating these species from their allies. In other instances this peculiarity is inconstant and valueless, as in *Xylophis perroteti*, *Cerberus* and *Hypsirhina sieboldii*,

&c. In *Amblycephalus* the same peculiarity is observed, and it appears to me a family characteristic since all the species I have had access to, elicit it. (*b*) In some of the genus *Lycodon*, notably *aulicus*, &c., and also in *Trachischium* the rule is again infringed by the meeting of the loreal with the internasals, and this is of particular importance in differentiating between species in the former.

(2) *The loreal.*—When a loreal exists, the præfrontal always comes into contact with it, but it is often absent, and leads to a variety of other relations.

(3) *Labials.*—This is an unusual relationship. It may exist with the presence of a loreal as an inconsistent occurrence in some *Dryophis*. In some snakes where the loreal is absent, the præfrontals effect a contiguity with certain labials, though it is far commoner in these cases to find the præocular meeting the nasals. In *Blythia*, *Calamaria*, and *Aspidura* this feature appears to be of generic importance, and in *Uropeltidæ* and *Ilysiidæ* a family peculiarity.

(4) *Præocular.*—When this scale is present, which is usually the case, it always forms a suture with the præfrontal.

(5) *The eye.*—This relationship is most unusual, for, as a rule, the præocular by meeting the supra-ocular effectually frustrates such a contingency; however, sometimes the præfrontal is permitted to contribute to the circumference of the orbit. This occurs in some *Lycodon*, *Callophis bibronii*, &c., where it serves to differentiate between species, and also in *Blythia*, *Cylindrophis*, *Xylophis*, *Calamaria*, and *Aspidura*, where it is equally valuable in characterising genera, and in *Amblycephalus* constitutes a family feature.

Posteriorly, the supra-ocular nearly always meets the posterior part of the præfrontal, but exceptions occur in *Coluber oxycephalus*, *Lycodon aulicus*, &c., of special importance, and in the genus *Dryophis* where contact with the supra-ocular is denied by the meeting of the præocular with the frontal and also in *Python* and *Zamenis diadema* where a supernumerary row of small scales frustrates the normal arrangement.

The frontal is nearly always one of the posterior relations of the præfrontal, but exceptions occur in *Python* and *Zamenis diadema* where a supernumerary row of scales prevents such contact.

The following examples will demonstrate some of the numerous variations in relationship this scale is subject to :—

Calamaria.—Rostral, 1st and 2nd labials, præoc., supraoc., frontal.

Cylindrophis.—Nasal, 2nd and 3rd labials, eye, supraoc., frontal.

Blythia.—Internasal, 2nd and 3rd labials, eye, supraoc., frontal.

Hydrophis.—Nasal, 2nd labial, præoc., supraoc., frontal.

Zamenis diadema.—Internasal, nasal, two or three loreals, præoc., supernumerary præfrontals.

Hypsirhina enhydris.—Internasal, loreal, præoc., supraoc., frontal.

Lycodon aulicus.—Internasal, loreal, præoc., frontal.

Aspidura.—Internasal, nasal, 2nd and 3rd labials, præoc., supraoc., frontal.

Coluber oxycephalus.—Internasal, nasal, loreal, præoc., frontal.
Hydrophobus nympha.—Internasal, nasal, two præoc., supraoc., frontal.
Dendrophis.—Internasal, nasal, loreal, præoc., supraoc., frontal.
Callophis bibronii.—Internasal, nasal, 3rd labial, eye, supraoc., frontal.
Naia tripudians.—Internasal, præoc., supraoc., frontal.
Bungarus.—Internasal, nasal, præoc., supraoc., frontal.
Amblycephalus.—Internasal, præoc., eye, supraoc., frontal.

THE FRONTAL.

This scale exhibits many important differences, and its characters are so well preserved in species of a like genus that, from the shape alone, with a little practice, one may often make a shrewd guess at the genus a given specimen belongs to. The number of scales with which it contracts a relationship is variable, and though this may generally be worked out from descriptions usually given in books, the due prominence this variability demands can only be attained by an expression of that number. Thus it is most usually six, as in *Zamenis, Simotes*, &c. It may be seven, as in *Platurus colubrinus*; eight, as in *Lycodon aulicus*,(normally), *Coluber oxycephalus, Simotes splendidus, Zamenis arenarius*, and *Hipistes*; and nine, as *Xenopeltis* and *Zamenis diadema* (normally).

Certain measurements are useful guides in differentiation. Of these one most usually quoted, *viz.*, that of its length compared with its distance to the end of the snout, I consider of little value. I find this very variable in like species of like size, and still more pronounced in young specimens compared with adults, and I have for this reason ceased to record it in my notes. The measurements I think of value are as follows:—(*a*) The breadth of the scale compared with the total breadth of the crown between the eyes, and to obtain precise results, an imaginary line is drawn across the crown connecting the *centres* of both eyes. In *Dryophis* and *Psammodynastes* it is about one-quarter the width or less; in *Naia* about one-third; in *Bungarus* and *Callophis*, about a half or more; in *Simotes* and *Lycodon*, about three-fifths; and in *Amblycephalus, Lytorhynchus, Xylophis, Cantoria*, &c., about two-thirds. (*b*) Its greatest length compared with that of the supra-ocular is useful in some cases. The three scales are usually sub-equal, but in many *Lycodon*, and in *Platurus*, the frontal is one-third longer, and in *Cantoria, Xenopeltis, Xylophis*, &c., it is twice the length of the supra-oculars. (*c*) The relative lengths of the sutures, especially when these are six, are of great importance. As a rule, the supra-oculars are the largest, as in *Zamenis, Dipsas*, &c. Sometimes they are even twice the suture made with the parietals, as in *Dryophis*, and some *Psammophis*, many *Coluber*, and many *Tropidonotus*. In *Cantoria, Xylophis*, &c., the supra-oculars are the smallest sutures. The parietals are usually the smallest sutures, as in *Chrysopelea*, and *Dryophis*, but they may be the largest as in *Fordonia*, and many *Hydrophiinæ*. Again, sometimes the præfrontals are the largest sutures, as in some *Amblycephalus*, sometimes the smallest sutures, as in many *Distira*.

THE NASALS.

The nasals are, I consider, of great value in differentiation. It is in their relations with labials particularly that they desire special importance. The number of labials which usually touch these scales is far most frequently two, *viz.*, the first and second ; but in some cases the first labial is the only one to touch the nasals, and this is a peculiarity which all the *Homolopsidæ* occurring in Indian limits, except *Hypsirhina plumbea*, share. In *Tropidonotus piscator*, it is an inconstant feature. Equally unusual is it for three labials to touch the nasals, but this peculiarity exists in *Naia*, *Xenopeltis* and *Callophis*.

THE NOSTRIL.

This has certainly escaped the due notice it deserves. In some snakes it occupies the whole depth of the suture between the nasal scales, as in many *Coluber*, *Naia*, *Zamenis*, &c. ; whilst in others it only occupies a portion of the depth, leaving some of the suture unimplicated above or below, or both above and below, as in *Dipsas*, *Simotes*, *Hydrophobus*. In some cases it is contained far more in the posterior scale, the anterior contributing but little to its circumference, as in *Naia*, *Coluber*, *Polyodontophis collaris*, &c., and, on the other hand the converse holds good in the case of *Xenopeltis*, *Dipsas*, &c. In *Tropidonotus piscator*, it is crescentic (convexity forwards) and placed obliquely in the upper half of the anterior scale, so that the lower horn of the crescent infringes upon the posterior scale. The lower suture nearly always runs to the first labial, except in *Hydrophiinæ*, where the rule is for it when present to run to the second labial.

THE LOREAL.

I have already discussed the confusion with regard to this scale in a footnote on page 94, B. N. H. S. Journal, Vol. XIV, No. 1.

PRÆOCULARS AND POSTOCULARS.

Some confusion exists in what to consider præoculars and postoculars, and for the sake of consistency I prefer to regard any scales touching the front of the eye, anterior to a labial which contributes to the orbit præoculars, and in the same way apply the term postoculars to all scales touching the eye behind, which are posterior to a labial which contributes to the orbit.

TEMPORALS.

The only temporals which can be said to be of any importance are those in the anterior row, the arrangement of the postjacent rows being most inconstant. It is of some importance to notice how many and what labials touch these scales (or the inferior of these when more than one is present). As a rule, the number is two, but in some instances it is one only, as in *Polyodontophis collaris*, *Dipsas cyanea*, *Cerberus*, *Fordonia*, *Platyplectrurus*, &c. Sometimes three labials come into contact, as in *Naia bungarus*, (normally), *Sallophis nigrescens* and *Callophis maculiceps*, etc.

THE SUB-LINGUALS.

It seems inconsistent that when all other scales worthy of a special name have received scientific titles, the "chin shields" so called, should be exempted, and I always refer to them in my notes as sub-linguals. The number of lower labials that touch the anterior pair is usually recorded, but not so those that touch the posterior pair, though these are as useful as the former. As a rule, two labials touch the posterior pair, but in some *Tropidonotus*, three come into contact; in *Bungarus cœruleus* and many *Callophis*, only one; and in *Platurus colubrinus* and *Latifasciatus*, none at all.

LOWER LABIALS.

There are one or two points touching the lower labials which have escaped notice. The suture between the first pair (when such is present) varies in length compared with the suture between the anterior sub-linguals. It is nearly always considerably less, varying from one-third to a half as a rule, but in many of the genus *Dipsas* it is unusually long, and usually fully equals that between the anterior sub-linguals. The relative size of some of these scales requires special mention. One in particular which is usually the largest of the series, and peculiar in having genuate posterior border, is important. In *Fordonia* and *Xenopeltis*, &c., this is the third of the series; in *Bungarus* and *Callophis*, &c., the fourth; in *Psammophis condanarus*, and some *Dryophis*, the fifth; in many *Zamenis*, the sixth; and in *Cerberus*, and many *Tropidonotus*, the seventh. Again, sometimes no lower labial exhibits this peculiarity, as in *Python*, and *Amblycephalus*. This scale I generally refer to as the "genuate" on account of its posterior border.

THE EYE.

Such terms as "small," "moderate," and "large" can at best only convey an uncertain meaning even to those well acquainted with the subject. I record two measurements which are much less indefinite—(1) The horizontal diameter which is compared with its distance towards the nostril. In many snakes this diameter about equals the distance to the nostril, as in *Bungarus*, &c. In some it falls far short, as in *Coluber oxycephalus*, &c., and in some is even as little as a third the distance as in *Xenopeltis*. In some *Dipsas*, and *Amblycephalus* it is greater than the distance to the nostril. (2) The vertical diameter is compared with its distance to the labial margin. In some snakes, such as *Simotes*, it about equals the distance; in others it is less, amounting in *Eryx johnii* to as little as half or even less; and again in others it is distinctly greater, amounting in *Chrysopelea* to about twice the distance.

I am aware that, owing to the early development of the eye, this organ is relatively larger in the young than in the adult; hence the above measurements must be considered as proximately correct only.

A CATALOGUE OF THE *HETEROCERA* OF SIKHIM AND BHUTAN.

By G. C. Dudgeon, F. E. S., &c.

With Notes by H. J. Elwes, F. Z. S., F. E. S., &c.,

and

Additions by Sir George F. Hampson, Bart., B. A., F. E. S., &c.

Part XII.

(*Continued from page 19 of this Volume.*)

Family ARCTIADÆ—continued.

Sub-family LITHOSIANÆ—continued.

Genus Chionæma, Herr Schäff.

1281*a*. *C. alborosea*, Wlk.

Sikhim, 1,800 feet; Bhutan, 2,500 feet. Females of this are very common, attracted to light. I have twenty of this sex, but only two males. I have two aberrant females, one of which has all the red markings replaced by yellow ones and the other which has veins 4 and 5 of the forewing arising from the cell. I do not think that *C. puella*, Drury, extends as far East as this, though it is a very common insect in the N.-W. Himalayas.

C. obliquilineata, Hmpsn.

Sikhim, 1,800 feet. This species has a large, erectile tuft on the costa of the forewing on the upperside from the ante-medial line to two-thirds of the costal length and a very large oval, brownish, unilobate fold on the underside. The apex of the forewing is quadrate, the costa distorted, and the submarginal pink band bent inwards along the costa. The ante- and post-medial bands are outwardly oblique. Veins 2, 3, 4, 6 and 7 of the forewing are curved upwards, and veins 3, 4, and 6, 7 of the hindwing are stalked. I took four males in July and August at Punkabaree, but the female is as yet unknown.

1284. *C. effracta*, Wlk.

Sikhim, 1,800—4,000 feet. I have three males and three females taken at light in June, August and September.

C. adita, Moore.

Sikhim and Bhutan, 6,400 feet up. This species appears in Sikhim collections as *C. signa*, Wlk. It, however, differs from that species in having the two discoidal spots on the forewing of the male separate

and the post-medial line on the forewing of the female bent outwards to the costa. I have taken it at Rissoom and Pasheteng in September and have a male from Col. Pilcher's collection, marked "August Sikhim 10000 feet."

1291. *C. guttifera*, Wlk.

Sikhim and Bhutan. A common insect at low elevations. The females, as well as the males, have three black spots. I have a single female with the spots yellow instead of black. It occurs everywhere from the foot of the hills up to 3,000 feet in July, August and September.

1294. *C. mölleri*, Elwes.

Sikhim, 1,800 feet; Bhutan, 2,500—3,000 feet. A well-marked species, generally larger than *C. guttifera*, with the hindwings white instead of yellow and the spots on the forewing large. I have two males and six females taken by me at light in January and August.

1285. *C. perornata*, Wlk.

Sikhim and Bhutan, 1,800—2,500 feet. A rare insect which I have only taken in August. Mr. Elwes remarks that although he has never taken it, he inclines to think that it is not so rare.

1301. *C. arama*, Moore.

Sikhim, 4,000—6,000 feet. A common insect at Kurseong from July to October. (I never took this at Darjeeling, and presume it is confined to the outer hills.—*H. J. E.*)

1293. *C. divakara*, Moore.

Sikhim, Yatung, 10,000 feet. I have a female from the latter locality, which has the black spots very small. (I found it abundant at Darjeeling in July.—*H. J. E.*)

1302. *C. dohertyi*, Elwes.

Sikhim, 4,500 feet. Rare in May and August.

1292. *C. sikkimensis*, Elwes.

Sikhim, 7,000—10,000 feet. I have one doubtful specimen which may be only *C. dohertyi* without the terminal yellow band on the forewing. (This was common on Tongloo at light in July 1886, and is easily distinguished from *C. dohertyi* by the position of the bands and spots.—*H. J. E.*)

1288. *C. candida*, Feld.

Sikhim, Yatung, 10,000 feet. Rather scarce, I think. I have one specimen from the latter locality. (Knyvett and Möller both got this at about 7,000 feet, but I do not know the exact locality.—*H. J. E.*)

1290. *C. puer*, Elwes.

Sikhim and Bhutan. I have only one female from the latter locality, taken in June. (I took one male of this at Darjeeling at light in July 1886, and have others from the Khasias, Nagas and Manipur.—*H. J. E.*)

1295. *C. detrita*, Wlk.

Sikhim and Bhutan, 5,000—7,000 feet. Occurs commonly in August at Labah, where many may be taken settled on the wet mossy rocks during the day. It is also common in the Kangra Valley, Punjab. (My specimens are marked April and October, but I never took it myself.—*H. J. E.*)

1296. *C. belissima*, Moore.

Sikhim, 6,800 feet up. Rare in May and June. I have two females only in my collection. (A rare species in Sikhim, whence I have two males only.—*H. J. E.*)

1284*a*. *C. dudgeoni*, Hmpsn.

Sikhim, 1,800 feet; Bhutan, 2,500 feet. I have one male and seven females in my collection, taken at light in May, July, August and September. The male has no costal fold or a very minute one. The hindwings and lines on the forewings are pale pink. (This seems commoner in the Khasias than in Sikhim.—*H. J. E.*)

1298. *C. coccinea*, Moore.

Sikhim, 1,000—3,000 feet. The males of this species vary greatly in colour. My darkest specimen is scarlet with a sub-basal orange patch and the three black spots surrounded with orange. My palest male has the sub-basal patch white, a white patch round the black spots, narrowing towards the inner margin, where it becomes yellowish, and a broad white border to the black post-medial line exteriorly. The females have only two black spots, and were formerly thought by me to be that sex of *C. bianca*, Wlk. I have reared both sexes of this species from the larvæ. The cocoon is formed of the long hairs of the larva, joined together in a regularly constructed net, and the pupa is suspended within it by a few transverse webs.

1286. *C. bianca*, Wlk.

Sikhim, 1,800 feet. Rarely taken. I cannot distinguish the female. The two-spotted female, which has been identified by Mr. Moore as this species, I have proved by breeding to belong to *C. coccinea*, Moore. (I have four females, of which three by their smaller size and paler colour of the hindwings seem to belong to this species rather than to *C. coccinea*.—*H. J. E.*)

1296. *C. gelida*, Wlk.

Sikhim, 1,800 feet up. This occurs, but not commonly, in September and November. I have also taken it in the Kangra Valley. (There were many specimens in Möller's collection, dated March. I never took it myself.—*H. J. E.*)

1300. *C. gazella*, Moore.

Sikhim, 5,500—7,000 feet. A rare species, of which I have only two females taken in May and June.

Genus SICCIA, Wlk.

1385. *S. taprobanis*, Wlk.

Sikhim and Bhutan, up to 6,000 feet. A common species attracted to light in August and September. I have also specimens which I took settled on damp rocks and mossy places in May and June.

1387. *S. guttulosana*, Wlk.

Sikhim, 5,000 feet. I have only procured this on one occasion, my specimen being obtained at Tukvar in August.

1391. *S. sagittifera*, Moore.

Sikhim, 7,000 feet. I have never taken this, but it has been obtained by Col. Pilcher in Darjeeling.

1388. *S. nilgirica*, Hmpsn.

Bhutan, 2,500 feet. I took one specimen of the variety *cinereicolor*, Hmpsn., at Fagoo in May.

Genus HYPOSICCIA, Hmpsn.

H. punctigera, Leach.

Bhutan, 6,400 feet. I took two specimens at light at Rissoom in September. It seems to be a rare species.

Genus PARASICCIA, Hmpsn.

1386. *P. maculifascia*, Moore.

Sikhim and Bhutan, 6,000—7,000 feet. Not uncommon at light in Darjeeling. My specimens were taken in June and July.

Genus OVIPENNIS, Hmpsn.

1416. *O. dudgeoni*, Elwes.

Sikhim, 5,500 feet. The only specimen I ever took was attracted to light at Tukvar. This is the type in Mr. Elwes' collection.

Genus ASURIDIA, Hmpsn.

1645*a*. *A. nigriradiata*, Hmpsn. (Plate II, Fig. 15.)

Bhutan, 2,500 feet. I took three in July 1895 at Fagoo attracted to light, one of which, the type, had the ground colour of the forewing pale pink; the other two are ochreous-yellow, with the same markings.

A. metaphœa, Hmpsn.

Sikhim and Bhutan, 2,000—3,000 feet. I have one male which I took at Fagoo in August at light. It measures considerably less than the female described by Sir Geo. Hampson, and has the forewings narrower than *A. nigriradiata*, Hmpsn.

Genus ASURA, Wlk.

1477. *A. nubifascia*, Wlk.

Sikhim, 10,000—12,000 feet. I have never taken this myself, but have several specimens taken by my collectors in June and July at high elevation.

1478. *A. melanoleuca*, Hmpsn.

Sikhim, 9,000 feet. I possess only one specimen given me by Col. Pilcher and taken in July.

A. umbrifera, Hmpsn.

Yatung. This I have not seen, but most probably it occurs in Sikhim proper also.

1459 (part). *A. dasara*, Moore.

Sikhim, 5,500 feet. I have only taken this on four occasions at Tukvar and Badamtam. All my specimens are females, and two bear dates September and October; the other two are in the British Museum collection.

1426. *A. undulosa*, Wlk.

Sikhim and Bhutan, 3,000—5,000 feet. Very common from May to October.

1429 (part). *A. obsoleta*, Moore.

Sikhim, 1,800 feet; Bhutan, 2,500 feet. I have only three examples which I took at light in July. It is distinctly scarce.

1463. *A. euprepioides*, Wlk.

Sikhim and Bhutan, 1,800 feet. The sub-species *interserta*, Moore, is not uncommon at low elevations in the Daling Division, occurring in June, August and September.

1462. *A. conjunctana*, Wlk.

Sikhim and Bhutan, 2,500—4,000 feet. Not uncommon in May, July and August. I have procured the larva upon the bark of the Guava, where it was probably feeding on minute mosses.

1476. *A. flavivenosa*, Moore.

Bhutan, 2,500 feet. I have only two males taken at light at Fagoo in September.

1429. *A. semifascia*, Wlk.

Sikhim and Bhutan, 2,500—3,000 feet. Scarce in June and October.

1459 (part). *A. nebulosa*, Moore.

Sikhim. I have never procured this. From the figure in the Cat. Lep. Phal. it appears to be a very distinct species from *A. humilis*, Wlk., with which it was placed as a synonym in the Moths of India. It is a third larger in expanse than *A. humilis*.

1440. *A. rubricosa*, Moore.

Sikhim. This is recorded by Col. Swinhoe from Sikhim, but I have never seen a specimen.

1454. *A. congerens*, Feld.

Sikhim. I have not taken this.

1456. *A. floccosa*, Wlk.

Sikhim. This also I have not met with.

1437. *A. strigipennis*, Herr Schäff.

Sikhim and Bhutan, 1,800—4,500 feet. This is found commonly from June to September, and shows considerable variation in the markings of the forewing, some examples having no marginal series of specks and occasionally wanting the medial oblique line.

1459. *A. humilis*, Wlk.

Sikhim and Bhutan, 2,500 feet. Considerably rarer than the last, and exhibiting some variation also chiefly with regard to the fusion or separation of the streaks on the forewing. My specimens were all taken at light in July, September and October.

1459 (part). *A. calamaria*, Moore.

ikhim and Bhutan, 2,500—4,800 feet. An easily recognised form which is somewhat scarce in these localities, but is quite common in the Kangra Valley. The forewings have only a black speck at the base and one at the end of the cell. I have taken it at light in August and October.

1417. *A. anomala*, Elwes.

Sikhim. I have not taken this.

1415. *A. rubrimargo*, Hmpsn.

Sikhim, 7,000 feet. The only specimen I have seen was in Colonel Pilcher's collection.

1423. *A. frigida*, Wlk.

Sikhim and Bhutan, 2,500 feet. This is a common species in the Daling District, occurring from May to July and again from October to December.

Genus MILTOCHRISTA, Hübner.

1317. *M. flavicollis*, Moore.

Sikhim. I have never seen a specimen.

M. cardinalis, Hmpsn.

Sikhim and Bhutan, 1,500—5,500 feet. This is a rare species of which I have only taken about half a dozen examples in fourteen years' collecting in these districts. It superficially resembles *Asura anomala*, Elwes, with which it was identified by me before Sir George Hampson pointed out the difference. My specimens were taken during the day settled on leaves of tea bushes and other plants, in June, July and August.

1472. *M. postnigra*, Hmpsn.

Sikhim, 1,800 feet. I have only obtained this species on one occasion at light at Punkabaree in September; it appears to be rare. There was a specimen in Col. Pilcher's collection.

1469. *M. punicea*, Moore.

Sikhim and Bhutan, 1,800—2,500 feet. I have a series of females of this species, and as this sex is not at all uncommon, whereas, as far as I can ascertain, the male is unknown, I am inclined to think that *M. postnigra*, Hmpsn., will be found to be that sex of the species. I have taken it at light from June to September.

1468. *M. cuneonotata*, Wlk.

Sikhim and Bhutan, 2,500 feet. A common insect at low elevation in Bhutan, where it may be found in July and August settled on walls of houses even in bright sunlight.

1470. *M. cruciata*, Wlk.

Sikhim and Bhutan, 6,000—7,000 feet. I think this must be rather a scarce insect; the only specimen in my collection was captured in September.

1471. *M. inflexa*, Moore.

Sikhim, 5,000 feet. I have only taken two specimens of this in May; it seems to be scarce.

1277. *M. roseata*, Wlk.

Sikhim. A handsome large insect which I have never seen.

1473. *M. gratiosa*, Guer.

Sikhim and Bhutan, 1,800—3,000 feet: var. *flammealis*, Moore, 6,800 feet. A very variable insect, occurring commonly, attracted to light from April to September. I am inclined to think that *flammealis*, Moore, is distinct, but it is not easy to define any feature which is sufficiently characteristic to separate it.

1464. *M. radians*, Moore.

Sikhim. I do not know this.

1465. *M. zebrina*, Moore.

Sikhim and Bhutan, 1,800—2,500 feet. A common insect at light at Fagoo in May and from July to September.

1428. *M. prominens*, Moore.

Bhutan, 2,500 feet. I have never taken this in Sikhim, but I have no doubt that it will be found there subsequently. My specimens I took at light at Fagoo in June and July.

1434. *M. delicata*, Moore.

Sikhim. I never received this. The type in the British Museum is a female, and the male appears to be as yet undescribed.

1433. *M. linga*, Moore.

Sikhim and Bhutan, 1,800—2,500 feet. A fairly common insect, occurring at light in June and September.

M. proleuca, Hmpsn.

Sikhim. I have not taken this.

1447. *M. spilosomoides*, Moore.

Sikhim. Recorded from this locality, apparently on the existence of a specimen so marked in Dr. Staudinger's collection.

1445. *M. perpallida*, Hmpsn.

Sikhim and Bhutan, 6,700 feet. I have only one specimen taken by me at light in September.

1445*a*. *M. hololeuca*, Hmpsn.

Bhutan. I have only taken this on one occasion at Fagoo attracted to light.

Genus CYCLOMILTA, Hmpsn.

C. melanolepta, Hmpsn. (Plate II, Fig. 14.)

Sikhim, 1,800 feet. The type is the only specimen I have taken, and is now in the British Museum. It was attracted to light at Punkabaree.

Genus SCHISTOPHLEPS, Hmpsn.

1492. *S. bipunctata*, Hmpsn.

Sikhim and Bhutan, 1,800—2,500 feet. This is rather scarce, but I have taken it attracted to light at Punkabaree and Fagoo in June and November.

Genus HEMIPSILIA, Hmpsn.

1289. *H. coa-vestis*, Hmpsn.

Sikhim and Bhutan, 6,400 feet. I have never taken this in Sikhim, but I took one specimen attracted to light at Rissoom in September. I also saw another settled on a leaf beside the road between Sumeabeong and Labah in the Daling Division.

Genus NUDARIA, Haw.

1487. *N. fasciata*, Moore.

Sikhim and Bhutan, 6,700—10,000 feet. I obtained one specimen at Pasheteng in Daling in October, but have not seen another.

1488. *N. margaritacea*, Wlk.

Sikhim, and Bhutan, 6,400—9,000 feet. This is a rather common and variable insect which occurs in Darjeeling and at similar elevations elsewhere in the district in June, August and October.

1486. *N. suffusa*, Hmpsn.

Sikhim, and Bhutan, 6,400 feet. I took this at Rissoom in September. Col. Pilcher also had specimens from Darjeeling.

1488*a*. *N. fumidisca*, Hmpsn.

Sikhim, 7,000 feet. Col. Pilcher took this in Darjeeling, but I have never received it.

1488*c*. *N. discipuncta*, Hmpsn.

Bhutan. The only specimen obtained by me was taken at light at Fagoo at a lower elevation than most of the species of this genus.

Genus DIDUGA, Moore.

1397. *D. flavicostata*, Snell.

Bhutan, 2,500 feet. I caught two specimens of this at light at Fagoo in May and July. It is so small and inconspicuous that it has probably been often overlooked by collectors.

Genus EUGOA, Wlk.

1402. *E. bipunctata*, Wlk.

Sikhim, and Bhutan, 1,800—3,000 feet. A common insect at light, varying much in the extent of the suffusion beyond the postmedial line and the ground colour of the forewing. My specimens were taken by me in May, July, August, September and October.

Genus STIGMATOPHORA, Staud.

1435. *S. palmata*, Moore.

Sikhim, 1,800 feet. I took three specimens of this species at light in May, July and September at Punkabaree. The black markings are much reduced in Sikhim specimens compared with those of a specimen I took in the Kangra Valley, Punjab; the former are also slightly smaller, and have yellow patches on the antemedial area of the forewing.

Genus TROPACME, Hmpsn.

1410. *T. cupreimargo*, Hmpsn.

Bhutan, 2,500 feet. I took one specimen of this well-marked species at Fagoo in July, but have never seen another.

Genus HEMONIA, Wlk.

1383. *H. orbiferana*, Wlk.

Sikhim and Bhutan, 1,800—5,500 feet. This I found very commonly attracted to light at Fagoo in May and from July to October. It varies considerably in size.

NOTES ON SOME OF THE PLANTS INTRODUCED INTO THE VICTORIA GARDENS, BOMBAY, DURING THE PAST 8 YEARS.

By Cavasji D. Mahaluxmivala.

Part II.

(*Continued from page* 131 *of this volume.*)

16. Phaseolus caracalla,* *L.* (Leguminosæ), Snail Flower creeper. It is a twining plant of the Tropics, believed to be a native of Brazil, and long grown in Indian gardens. I have known this creeper growing in Poona for many years past, but it has never been very common there. It is an interesting plant from the peculiar shape of its fragrant purplish flowers turning yellowish when old, the corolla of which is spirally twisted like a corkscrew, giving the unopened buds a curious resemblance to snail-shells. It flowers in August and September. Plants were obtained from Messrs. Vishnoo Sadashiv & Co., Poona, in February, 1896, and again in August, 1900, from the Empress Botanical Gardens, Poona, but they do not seem to stand the climate of Bombay well, and several plants raised from seed this year also seem to be dying without flowering.

17. Euryale ferox,† *Salisb.* (Nymphæaceæ). It is an annual aquatics native of India and China. It is remarkable for its large circular puckered leaves with strong spiny ribs, about two feet in diameter, green above and purple beneath. The flowers are small, violet, prickly, and being partially submerged are inconspicuous. The seeds are eatable when roasted. It is no doubt a noble plant on account of its very large leaves, second only to the *Victoria regia* in this respect. Two plants raised from seeds obtained from the Superintendent, Baroda Gardens, in April, 1896, were planted in one of the ornamental ponds in the Garden, but were destroyed by the large fishes that are plentiful in this particular pond. They were again obtained from Baroda in August, 1897, and the plants flowered then, but were again destroyed by the fishes, &c., before seeding. Plants lately presented by Mr. G. H. Krumbiegel, Superintendent of the Baroda Gardens, were planted in a new water pond specially made for growing aquatics, but they have not survived, having suffered irreparable damage during the transit by rail.

18. Swietenia macrophylla,‡ *King* (Meliaceæ). Large-leaved Mahogany. Plants raised from seeds presented by the Superintendent, Royal

* The name is derived from the old Greek name, probably from *Phaselus*, a little boat from the fancied resemblance of the pods, and from *caracol*, its native name in South America.

† The name is derived from *Euryale*, one of Ovids Gorgon's of fierce aspect, and from *ferox*, fierce, both in allusion to the prickly nature of the plant.

‡ It is named after Von Swieten, a Dutch botanist, and from *macros*, long, and *phyllon*, a leaf, the leaves of this species being larger than those of the true mahogany.

Botanical Gardens, Calcutta, in April, 1896, and afterwards all seem to be doing very well in Bombay. It appears to be a straight, tall tree of rapid growth. It has not yet flowered here. Dr. A. V. Gage, Curator of the Herbarium of the Royal Botanic Gardens, Calcutta, has kindly supplied me with the following information about its introduction in India :—

"*Swietenia macrophylla* is a large-leaved species of mahogany which was sent over as seed, a good many years ago, from the West Indies. It was supposed to be *Swietenia Mahogani* seed that had been sent. Dr. King, as he then was, discovered that the plants resulting from the seeds were quite different from the *Swietenia Mahogani*."

19. EUCALYPTUS GLOBULUS,* *Labill.* (MYRTACEÆ). Blue Gum Tree. This well-known Australian tree, growing to a height of about 300 feet, is reputed to possess febrifugal properties, and is extensively planted on that account in malarious districts. The oil obtained from the leaves is antiseptic, and the antimalarial properties of the tree are considered to be due partly to the antiseptic vapours given off by the leaves into the surrounding air, which are supposed to kill the germs of malaria. The leaves and branches which cover the soil containing a large proportion of eucalyptol may also prevent the development of the germs. But its action in this respect is also ascribed to the absorption of large quantities of water by its roots during its rapid growth and passing it off through the leaves as healthy vapour and thus rapidly draining swampy land and making it unsuitable for malarial germs. This latter hypothesis receives some confirmation from the recent researches on the connection of malaria with mosquitos which breed in shallow pools and swampy land. This tree has been tried by me over and over again, but has never survived for more than two or three years at the most. The seeds germinate freely and the plants grow well for some time in pots, but after making some growth both the plants in pots and those planted in the ground die during the rainy season. As the tree only grows and thrives at very high elevations and in soil which is neither too dry or too wet, there is no chance of its thriving in a place like Bombay.

Another species EUCALYPTUS CITRIODORA, *Hooker*, called Lemon-scented Gum Tree on account of the leaves emitting, when rubbed, a powerful odour resembling that of the lemon-scented verbena (*Aloysia citriodora*), is said to succeed in tropical climates. This has also been tried here, but without much success. It has, however, not failed so completely as *E. globulus* and is likely to succeed well in Bombay on a somewhat drier soil than that of the Victoria Gardens.

The only other species which has entirely succeeded in the gardens is EUCALYPTUS SIDEROPHLOIA, *Benth.*, called the White Iron-bark Tree, which

* The name is derived from *eu*, well, and *kalyptos*, covering, on account of the bud of its flower being covered with the lid-like limb of the calyx which falls off as soon as the flower opens, and from *globulus*, a little globe.

furnishes one of the strongest and most durable timber of New South Wales suitable for railway sleepers, spokes of wheels and handles of tools and implements.

Another species which is likely to thrive here is EUCALYPTUS ROSTRATA, *Schlecht.*, called the Red Gum Tree, which is said to grow at low elevations and on moist clayey grounds.

20. KÆMPFERIA ROSCŒANA,* *Wall.* (SCITAMINEÆ). A very beautiful dwarf, stemless, herbaceous perennial, native of Burmah. The leaves are tufted, large, undulated, roundish, spreading flat on the ground and marked on the upper surface with bands of dark and light green and dark purple or black. The flowers described in Hooker's "Flora of British India" as white are entirely white outside, but the inner side of the limb is bright pale purple with a white or creamy eye in the centre. They are sessile appearing in the centre of the plant in succession. The plant was purchased from the Agri-Horticultural Society of India, Calcutta, in August, 1899, and seems to do very well in Bombay. It starts into growth in the beginning of the rains, and should be gradually dried up after the rains are over.

21. KÆMPFERIA GILBERTI,† *Hort.* (SCITAMINEÆ). This is also an attractive dwarf, stemless, herbaceous perennial, native of Burmah. The leaves are dark green, lanceolate, with wavy margins and bordered with broad cream-coloured bands. The flowers are fugitive, sessile, white, with a bright purple lip.

22. KÆMPFERIA GALANGA, *L.* (SCITAMINEÆ), *Chanda Mula.* This very dwarf *Kæmpferia* is a native of India and Malaya. The leaves are large, tufted, roundish and spreading flat on the ground like those of *K. roscœana*, but are entirely dark green. The flowers are fugitive, white with lilac throat.

All the three *Kæmpferias* described above were purchased in 1899 from the Agri-Horticultural Society of India, and seem to do very well in Bombay.

All of them flower after the leaves come out, and are therefore unlike the more generally known and commonly cultivated *Kæmpferia rotunda, L., Bhui champa*, whose lovely sweet-scented flowers appear at the end of the hot weather before the leaves come out.

23. ZINGIBER DARCEYI ‡ (SCITAMINEÆ). It is a perennial herb from two to three feet high, introduced in England in 1890 from the Sydney Botanical Garden. The leaves are large, shining green, with a broad creamy white margin and oblique stripes of the same colour. The flowers appearing in September are radical in large dense oblong spikes with persistent bracts

* Named after a German naturalist, E. Kæmpfer, and after Roscoe.

† Named after Kæmpfer and after Gilbert.

‡ The name is derived from Greek *Zingiberis*, originating from Sanscrit *crngavera*, horn-shaped, probably in reference to the form of the rhizomes and after D'Arcy.

which are green at first, turning scarlet afterwards. The calyx is white, translucent, and the corolla cream-coloured with a pale yellow lip. The plant was obtained as a present from Mr. Krumbiegel, Superintendent, Baroda Gardens, in December, 1896.

24. OXYSTELMA ESCULENTUM * *Br.* (ASCLEPIADEÆ), *Dudhika* or *Dudhani.* It is a deciduous leaved, very slender, herbaceous, twining perennial found throughout the plains and lower hills of India. The leaves are membranous, linear lanceolate. It begins to flower in July, the flowers being saucer-shaped, entirely white outside, and spotted and veined with purple inside, and are inflated in bud. The plant was collected by my Overseer from near Bassein in 1900. It seems to do well in Bombay.

25. SOLANUM SEAFORTHIANUM† (SOLANACEÆ). It is a beautiful herbaceous climber of the West Indies. The leaves are pinnately divided into about nine segments. The flowers are light purple outside and violet blue inside, and are produced in gracefully hanging panicles, succeeded by beautiful bunches of cherry-red round berries. It begins to flower here in July, flowering in succession afterwards till December. After flowering and fruiting it appears to drop the leaves and to go to rest in the hot weather, when care is necessary to water it sparingly. It can be propagated easily from seeds.

26. SOLANUM WENDLANDII, *Hook. f.* (SOLANACEÆ). An herbaceous climber of Costa Rica, somewhat similar to the above, but of thicker and stronger growth in stem, leaves, &c. The flowers are large, about two inches in diameter, and of a beautiful pale lilac-blue colour. It is propagated by cuttings.

Both the above creepers were purchased from the Agri-Horticultural Society of India, Calcutta, in January, 1898, and appear to do very well in Bombay.

27. KLEINHOVIA HOSPITA,‡ *L.* (STERCULIACEÆ). It is a native of Malay Archipelago and doubtfully of India, but is widely distributed in India, Ceylon, Java, Mollucas, &c. It is a medium sized tree with large heart-shaped light-green leaves and terminal panicles of handsome pale pink flowers which begin to appear in August and continue flowering till November. The fruit is an inflated, top-shaped, five-winged, membranous capsule. The plants were raised from seeds obtained from the College of Science Garden, Poona, in October, 1898, and they seem to do well. One of them planted in the ground began flowering in 1900, when it was about 10 feet high. Another has grown about 16 feet high, but has not flowered yet.

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* The name is derived from *Oxys*, sharp, and *stelma*, a girdle, on account of the acute segments of the corona, and from *esculentum*, edible, on account probably of its follicle or fruit being said to be eaten in Sind. The fruit and the leaves are also said to have been eaten by the poorer classes in Poona and Khandesh during the famine of 1897-98.

† The name is derived from the old Latin name used by Pliny, probably from *Solar* to comfort, from the soothing narcotic effect of this family, and after Seaforth.

‡ Named after Kleinhoff, a Dutch botanist, and probably from *hospitalis*, pertaining to a guest.

28. EPISCIA CHONTALENSIS,* *Hook. f.* (GESNERACEÆ). It is a beautiful, very dwarf, herbaceous perennial, native of Nicaragua. It is very similar in appearance and habit to the other species, *Episcia fulgida*, commonly grown in our conservatories under the synonymous name of *Cyrtodeira fulgida*. The leaves are very hairy, bullately reticulated or puckered between the veins, the upper surface being of a dull light brownish-green colour with a bright green band along the midrib, and the underside bright purple. The flowers are white suffused with lilac with a yellow throat. Like the *Episcia fulgida* it is a very handsome conservatory plant suitable for rock-work and hanging baskets. It is propagated from the creeping shoots which take root when pressed in the soil. The plant was obtained as a present from Mr. C. Maries, Superintendent, State Gardens, Gwalior, in October, 1895. It appears to be a more delicate plant than *E. fulgida*, as it does not seem to thrive so well in the Gardens.

29. ARISTOLOCHIA LEUCONEURA, † *Linden.* (ARISTOLOCHIACEÆ). It is a handsome climber, native of Columbia. The leaves are large, heart-shaped, dull green, veined with bright light green. The flowers are comparatively small, about two inches in size, borne in bunches on the corky bark of the old lower stems, the pouch being yellowish green, veined with brown, the tube olive brown, and the ear-shaped lip purplish brown outside and thickly studded with little light brown warts inside, while the throat is cream-veined dull dark brown. The pods are said to be vanilla like. This climber was purchased from the Agri-Horticultural Society of India, Calcutta, in January, 1898, and thrives well here. It has commenced flowering only this year, the flowers appearing in July and August.

30. QUASSIA AMARA, ‡ *L.* (SIMARUBEÆ), *Suranam Quassia.* A tree of Tropical America (Guiana), said to be twenty feet high. The leaves are large, pinnate, with five articulated leaflets, dark glossy green, the midribs being red. The petiole is also red and winged. The flowers are in terminal panicles, each about one inch, of a coral red colour. The whole plant contains a bitter principle, and the wood furnishes the well-known "Quassia chips" used as an insecticide by gardeners, and for medicinal purposes. The plant was purchased from the Agri-Horticultural Society of India, Calcutta, in 1897. It has been propagated by laying. It begins to flower here in September, and remains in flower through the cold weather. It does not seem to bear exposure to sun at noon, and requires, therefore, to be planted in a situation where it can receive partial shade at noon. It does not grow into a tree here, as it does in its native habitat, but has remained a shrubby plant only about five feet high.

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* The name is derived from *Episkios*, shaded, as they grow in shady places.

† The name is derived from *Aristos*, best, and *locheia*, parturition, from its supposed medical properties, and from *leuconeura*, meaning white-veined.

‡ The name of the genus was applied by Linnæus to a tree of Surinam in honour of a negro, Quassi, who employed its bark as a remedy for fever, and the specific name, *amara*, means bitter from the properties of the plant.

31. SAINTPAULIA IONANTHA,* *Wend.* (GESNERACEÆ). It is commonly known as the Natal, Transvaal, or South African violet. It is an attractive perennial, stemless, hairy, herbaceous plant, native of Eastern Tropical Africa. Leaves are petioled, oval or roundish, about two inches in diameter, dark green, cordate, with crenate margin. The flowers are nodding, about an inch in diameter, two-lipped, violet blue. The plant was purchased from the Agri-Horticultural Society of India, Calcutta, in February, 1901. It has been propagated like the begonias by putting down the leaves as cuttings. It seems to thrive well here in partial shade and has been cultivated as a conservatory plant. It has begun flowering in December this year, and is said to be flowering continuously throughout the year.

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* Named in honour of Baron Walter Saintpaul, who discovered it in Africa and introduced it in Europe in 1893, and from *ionantha*, meaning violet-flowered.

THE BIRDS OF THE MADHUBANI SUBDIVISION OF THE DARBHANGA DISTRICT, TIRHUT, WITH NOTES ON SPECIES NOTICED ELSEWHERE IN THE DISTRICT.

By C. M. Inglis.

Part III.

(*Continued from page* 139.)

(99) Anthus trivialis.—The Tree Pipit

Oates, No. 840 ; *Hume*, No. 597.

I have a couple of skins, browner on the back than those usually got here of *maculatus*. I sent one to Mr. Baker, but he identifies it as *maculatus*, so probably the other one is also of that species ; if this proves to be the case then *trivialis* must be eliminated from our list. I forgot to mention that during the cold weather swarms of wagtails stay the night in the sugar-cane. The usual native name for all pipits is *Bagheyri*.

(100) A. maculatus.—The Indian Tree Pipit.

Oates, No. 841 ; *Hume*, No. 596.

Very common during the cold weather in all mango groves. They arrive later than the wagtails. Most of the birds sold as ortolans during that period belong to this species. Native fowlers called *Mir-shikars* snare them with bird lime smeared on a thin pliant fork of bamboo. This fork is placed on the end of a bamboo rod, several of these rods being jointed together like a fishing rod. The man carries a screen of leaves which he holds in front of him. When within striking distance he pushes forward his rod very gently till he gets close up to the bird and then with a sudden jerk he has caught it. He leaves it struggling to get away and pushes forward another rod and snares a second bird out of the number that always come round the one that was caught first. He then draws in the first rod, pulls out the primaries of one wing and places the captive in a basket. I have seen over half a dozen pipits caught in this way at one place before the fowler had to change his quarters. Native name according to Mir-shikars *Musrenchi bagheyri*.

(101) A. richardi.—Richard's Pipit.

Oates, No. 845 ; *Hume*, No. 599.

This species is also I think a cold weather visitant. Mr. Scroope also believes he has seen it.

(102) A. rufulus.—The Indian Pipit.

Oates, No. 847 ; *Hume*, No. 600.

Very common and breeds from February to June. A nest containing 3 young was taken on the 28th February ; this is the earliest date I have recorded. Three is the full complement of eggs, four being seldom found. Most eggs are to be got in April and June. I had a peculiarly coloured skin, it was cream colour. I sent it to Mr. Scroope and he says it must be a *lusus naturæ* and that he would call it a nearly albino Indian Pipit. I have mislaid the specimen.

(103) A. ROSACEUS.—Hodgson's Pipit.

Oates, No. 850 ; *Hume*, No. 605.

I had quite overlooked this species till this February when a *Mir-shikar* brought me in one. He said it was fairly common near marshes and I have got several more specimens. The fair skins I have are all of young birds Native name according to Mir-shikars *Paniella bagheyri*.

Family *Alaudidæ*.

(104) ALAUDA GULGULA.—The Indian Sky Lark.

Oates, No. 861 ; *Hume*, No. 767.

Common in the cultivation and grasses. I have not been successful in finding the eggs, though they undoubtedly breed here. I fired at a large lark near Narhar on the 20th November, 1899, but unfortunately missed it. I think it must have been *arvensis*. Native name *Bhurut*.

(105) CALANDRELLA BRACHYDACTYLA.—The Short-toed Lark.

Oates, No. 862 ; *Hume*, No. 761 (pt.)

The 17th October is the earliest date recorded by me for the arrival of short-toed larks. A small flock was seen on that date near Baghownie Fly. I do not think this species is so common as the following one, but I have not examined many specimens. In March and April large flocks of this and the next species are seen in the paddy fields and are then as fat as butter and excellent eating. During this time these take the place of pipits as ortolans. The native name for all these short-toed larks is *Pulluk*, Mir-shikar's name *Akonia*.

(106) C. DUKHUNENSIS.—The Rufous Short-toed Lark.

Oates, No. 863 ; *Hume*, No. 761 (pt.)

The above remarks also serve for this species. The cowherd boys near Baghownie snare them in nooses.

(107) C. TIBETANA.—Brook's Short-toed Lark.

Oates, No. 864.

Mr Baker says of a skin sent to him that it probably belongs to this species as there is so pure a white on the outermost tail feathers.

(108) ALAUDULA RAYTAL.—The Ganges Sand-Lark.

Oates, No. 866 ; *Hume*, No. 762.

Common on the banks of the Kamla and probably of the other rivers in the District. Males shot at the end of February and middle of April had the testes enlarged and must have been breeding. I was, however, unsuccessful in finding the nests.

(109) MIRAFRA ASSAMICA.—The Bengal Bush-Lark.

Oates, No. 870 ; *Hume*, No. 754.

Very common. I have taken the eggs from March to July. Native name *Agghin*.

(110) GALERITA CRISTATA.—The Crested Lark.

Oates, No. 874 ; *Hume*, No. 769.

I have seen very few in the subdivision, but near the Baghownie and Hasowlie Factories they were rather common. They commence building in February and I have taken their eggs near Baghownie in March and April. All the nests were under clods in paddy land and the birds were very wary in approaching them. Native name *Chandool.*

(111) G. DEVA.—Syke's Crested Lark.

Oates, No. 875 ; *Hume*, No. 765.

Blanford in Vol. IV of Stray Feathers gives Behar as within the range of this species, but I have not come across it here.

(112) PYRRHULAUDA GRISEA.—The Ashy-crowned Finch-Lark.

Oates, No. 879 ; *Hume*, No. 760.

Very common. I have taken eggs from February to May in the same situations as *G. cristata.* Some birds breed earlier in January and I saw a pair building in the beginning of September. A hen bird was seen trying to feed a dead young one which was lying in the nest. Name according to Mir-shikar *Gotewli.*

Family *Nectariniidæ.*

Sub-family *Nectariniinæ.*

(113) ARACHNECHTHRA ASIATICA.—The Purple Sun-bird.

Oates, No. 895 ; *Hume*, No. 234.

Abundant. It breeds from February to May. I have taken nests from many situations. Some were found hanging under the eaves of houses and others hanging from bamboos, creepers, thorny hedges, twigs of small bushes, pomegranate, peach, kheir and mango trees. Most were from 2 to 5 ft. from the ground, one was about 20 and another about 40 ft. up in a mango tree. The earliest nest was taken on the 26th February, the latest with eggs on the 30th May. I have seen them picking small insects off the ground and often watched them flying up and catching insects on the wing. Only the female builds the nest and hatches the young, and an egg is laid daily till the number is complete. These sun-birds can be reared as I kept an *A. seylonica* for about six months in a cage feeding it on sugar mixed in *sattoo.* It died from the cold as it had an iron perch which I omitted to cover during the cold weather. It lived from August to January.

Family *Dicæidæ.*

(114) DICÆUM ERYTHRORHYNCHUS.—Tickell's Flower-pecker.

Oates, No. 919 ; *Hume*, No. 238.

Common. They breed here in March and April. I have found very few nests and have not succeeded in getting the eggs ; though one nest had two eggs in it which were destroyed by *D. rufa.* I have found two young in a nest and probably two is the full complement of eggs laid. These birds commit a good deal of damage to the ripe mangoes and guavas.

(115) PIPRISOMA SQUALIDUM.—The Thick-billed Flower-pecker.

Oates, No. 921 ; *Hume*, No. 240.

If anything, commoner than the last species. They breed from March to June. All my nests, with one exception, were built on mango trees from 12 to 20 ft. from the ground, the other was being built on a tamarind tree at Narhar about the end of February but was deserted. All the nests were found hanging from the extremity of the thinnest twigs and generally from those on the outermost branches. The nests were like those described by Captain Beavan, but some were of a much greyer tinge ; the commonest colour however is orange brown. An egg is laid daily till three, which is the full number, are laid.

ORDER PICI.

Family *Picidæ*.

Subfamily *Picinæ*.

(116) LIOPICUS MAHRATTENSIS.—The Yellow-fronted Pied Woodpecker.

Blanford, No. 972 ; *Hume*, No. 160.

Rather uncommon. The few nests I have taken of this species were during April and May. I have seen others but they were always deserted. I have been most unfortunate with my woodpecker's nests, by far the greater proportion being deserted. I think this species here invariably make holes in the thinner branches of trees and never in the trunks themselves. All woodpeckers are called *Kat-kodi* by the natives.

(117) IYNGIPICUS HARDWICKII.—The Indian Pigmy Woodpecker.

Blanford, No. 976 ; *Hume*, No. 164.

Fairly common. I have only taken two nests with eggs of this species. In May 1899 I found over half a dozen pairs busy making nest holes in the thin branches of mango trees ; the birds were seen at all times of the day busy excavating and though never disturbed not a single pair laid eggs. They commence excavating in February. The nests with eggs were taken on the 24th March and the 12th July respectively. The first contained 3 slightly incubated eggs and the latter two fresh ones. Sometimes the holes are made in fairly thick branches but usually in thin ones.

(118) MICROPTERNUS PHÆOCEPS.—The Northern Rufous Woodpecker.

Blanford, No. 983 ; *Hume*, No. 178.

Scarce. It breeds here in April and May. I have the following note on its nidification. At Narhar, in the nearly horizontal trunk of a decayed tree standing out from a bund that overlooked a drain and surrounded by bamboos, was a hole in which some wasps had made a nest. This hole was about 7 ft. from the ground and had presumably been deserted by the wasps. In this nest a rufous woodpecker had bored a hole and laid four eggs which were slightly incubated. The eggs were absolutely glossless,

(119) BRACHYPTERNUS AURANTIUS.—The Golden-backed Woodpecker.
Blanford, No. 986; *Hume*, No. 180.

Very common. A female shot on the 1st December 1898 had the feathers on the upper back and rump black tipped with golden olive. This species breeds from March to July but commence excavating in February. They often bore into the trunks of trees but not invariably and prefer mango, but I have also found their holes in leechee and siris trees. I have seen them feeding on the ground.

Sub-family *Iynginæ.*

(120) IYNX TORQUILLA.—The Common Wryneck.
Blanford, No. 1003; *Hume*, No. 188.

Rather rare; but a few are generally to be seen every cold weather. I have secured four or five specimens. The scrub jungle which often grows on the banks of tanks seems to be rather a favourite place for this species. They arrive about the end of October, I having got one on the 24th of that month, and appear to remain till the middle of April.

Family *Capitonidæ.*

(121) THEREICERYX ZEYLONICUS.—The Common Indian Green Barbet.
Blanford, No. 1008; *Hume*, No. 193.

Very common. It breeds from April to June. Common though it is I have found very few nests and only taken one clutch of eggs. The latter were got from a hole in the trunk of a mango tree about 7 ft. from the ground and were quite fresh. Four is I think the full complement of eggs, but I have had a nest brought me containing 3 young.

(122) XANTHOLÆMA HÆMATOCEPHALA.—The Crimson-breasted Barbet.
Blanford, No. 1019; *Hume*, No. 197.

Exceedingly common, breeding from February to July. They lay from two to four eggs, three being the usual number. On the 3rd July I took 2 nearly fledged young from a hole in the branch of a *champa* tree. I cut off the branch below the hole, leaving about 10 inches on the tree; on the 21st I found a new hole had been excavated in the remaining piece of the branch and from it I got 3 fresh eggs. The branch was again cut leaving only 3 or 4 inches on the tree and on the 29th a new hole had been made in it right into the trunk of the tree; this hole, however, was deserted.

ORDER ANISODACTYLI.

Sub-order Coraciæ.

Family *Coraciadæ.*

(123) CORACIAS INDICA.—The Indian Roller.
Blanford, No. 1022; *Hume*, No. 123.

This species, commonly known to Europeans here as the Blue Jay, is extremely common. It breeds from March to June, and most eggs are to be got in April. I have never found any birds so wary about their nests as those mentioned by Mr. B. Aitken in Hume's Nests and Eggs. They have always

been very noisy and pugilistic, flying out at any bird, from a vulture downwards, that came near their nests. A pair took possession of a pigeon-house near my bungalow at Narhar, driving out the rightful owners. Mir-shikar's name *Sabsuk* ; ordinary native name *Nill Kunt.*

SUB-ORDER MEROPES.

Family *Meropidæ.*

(124) MEROPS VIRIDIS.—The Common Indian Bee-eater.

Blanford, No. 1026 ; *Hume*, No. 117.

Very common. It breeds from March to May. I have several times found seven eggs in the same nest, and on one occasion found a nest containing a single young one. Native name *Patringa.*

(125) M. PHILIPPINUS.—The Blue-tailed Bee-eater.

Blanford, No. 1027 ; *Hume*, No. 118.

I have found this species scarce in the subdivision though common near Baghownie from the middle of March throughout the rains. Mr. Scroope, however, says he has observed it in many places during the rains. I have noticed them up to October and they do not remain here after then. I found them breeding in numbers not far from Hatauri during April and May in the banks of the Keray River. Mir-shikar's name *Dorla.*

SUB-ORDER HALCYONES.

Family *Alcedinidæ.*

(126) CERYLE VARIA.—The Indian Pied Kingfisher.

Blanford, No. 1033 ; *Hume*, No. 136.

Very common. It breeds from February to April and again in October. They do not invariably lay in holes of banks overlooking running water as supposed by Hume for I have on several occasions taken their eggs from holes in banks of tanks. I have seen one swallow a fish on the wing ; they usually take it to the bank and eat it there. Mir-shikar's name *Korona.*

(127) ALCEDO ISPIDA.—The Common Kingfisher.

Blanford, No. 1035 ; *Hume*, No. 134.

Common during the cold weather and up to April. I *once*, however, saw one in July. I have not found their nest. Sometimes this species is seen hovering and diving like *C. varia.* Mir-shikar's name *Farissi.*

(128) PELARGOPSIS GURIAL.—The Brown-headed Stork-billed Kingfisher.

Blanford, No. 1043 ; *Hume*, No. 127.

I have not found this species very common, but Scroope says it is so in most places. Though a male shot on the 20th January had enlarged testes and was probably breeding, I have never found the nest. Mir-shikar's name *Tunnak.*

(129) HALCYON SMYRNENSIS.—The White-breasted Kingfisher.

Blanford, No. 1044 ; *Hume*, No. 129.

Fairly common in most places but rather scarce round about Jainagar. I have found it a very wary bird here quite unlike those I came across in

Cachar. Large numbers are snared by the native fowlers. One man told me that he usually snared 100 to 150 from October to January and that they fetched from Rs. 15 to Rs. 20 a hundred. This shows what a number of this useful Kingfisher are killed, as in some parts of the country there are small hamlets of these men who do nothing else, during that time of year, but snare these birds. The native name here is *Tunki*.

(130) H. PILEATA.—The Black-capped Kingfisher.
Blanford, No. 1045 ; *Hume*, No. 130.

I have already, in this Journal, recorded the occurrence of this species in the District and regret to say it has not been come across again.

SUB-ORDER BUCEROTES.
Family *Bucerotidæ*.

(131) LOPHOCEROS BIROSTRIS.—The Common Grey Hornbill.
Blanford, No. 1062 ; *Hume*, No. 144.

Very common. They are often seen picking fallen fruit off the ground. The note sounds like pee-ye. Three eggs and a hornbill were brought to Narhar by a native on the 16th April. I was away from home at the time, but the man told my servant that they were got in a mango tree and also mentioned the birds being closed up inside the hole with dung. The eggs are small for the size of the bird. On the 19th of April I found a nest hole high up in a large Simul tree, a few miles from Narhar. The hole had previously been made by a parrot and must have been enlarged by the hornbills. The male bird flew up at the hole, so I expect the female was safely shut up inside. I could get nobody who dared climb the tree, so was unable to investigate the matter. Native name *Duness*.

SUB-ORDER UPUPX.
Family *Upupidæ*.

(132) UPUPA EPOPS.—The European Hoopoe.
Blanford, No. 1066 ; *Hume*, No 254.

Not uncommon during the cold weather.

(133) UPUPA INDICA.—The Indian Hoopoe.
Blanford, No. 1067 ; *Hume*, No. 255.

Common. Many birds are hybrids between the two species. It breeds in February, March and April. The earliest eggs were got on the 12th February. It is only lately that I have been successful in getting eggs though I have found many nests but all had either young or were deserted. Here they build oftener in holes in the mud walls of houses than in trees. I tried to rear some young ones but they died in a very few days. During the day they were very quiet but in the evening chirruped a lot. On the 25th February, I got a nest with five eggs, two were broken in the nest, from a crack in some mortar on my bungalow roof, and though the hen-bird was handled rather roughly, all her rectrices being pulled out, she has selected a new site for a nest near my chimney. Native name *Hud-hud*.

ORDER MACROCHIRES.
Sub-order Cypseli.
Family *Cypselidæ*.
Sub-family *Cypselinæ*.

(134) CYPSELUS MELBA.—The Alpine Swift.
Blanford, No. 1068; *Hume*, No. 98.

Not an uncommon visitant during the rains. The earliest arrivals were noticed on the 18th April. I have seen them in May, but most are noticed from June to September. I have not succeeded in getting any specimens but am certain the identification is correct.

(135) C. AFFINIS.—The Common Indian Swift.
Blanford, No. 1073; *Hume*, No. 100.

I have found this species uncommon. A few years ago I saw them nesting on the rafters in the Maharajah's stables at Darbhanga, but am not aware whether they still do so or not. I have seen them from February to October, except during March and July. On the 3rd October a pair flew several times into my verandah at Baghownie, one settling on one of the bamboos in the roof.

(136) TACHORNIS BATASSIENSIS.—The Palm Swift.
Blanford, No. 1075; *Hume*, No. 102.

Very common. I have found them breeding from February to August. The earliest nest was taken on the 25th of February and the latest on the 2nd August. A nest from which 2 fresh eggs were taken on the 1st March contained a young bird on the 15th April. Two nests are never found on the one leaf though several pairs usually build on the same palm (*Borassus flabelliformis*). Most of my eggs were got in March.

SUB-ORDER CAPRIMULGI.
Family *Caprimulgidæ*.

(137) CAPRIMULGUS ASIATICUS.—The Common Indian Nightjar.
Blanford, No. 1091; *Hume*, No. 112.

I have a single skin of this species shot at Anarh Fty, on Xmas Day 1899.

(138) C. MACRURUS.—Horsfield's Nightjar.
Blanford, No. 1093; *Hume*, No. 110.

This is the common species found here. I have been unsuccessful in finding its eggs but am certain it breeds here. Native name *Chupka*.

ORDER COCCYGES.
Family *Cuculidæ*.
Subfamily *Cuculinæ*.

(139) CUCULUS MICROPTERUS.—The Indian Cuckoo.
Blanford, No. 1107; *Hume*, No. 203.

I have noticed this species from the end of March to July during which months it is fairly common.

(140) HIEROCOCCYX VARIUS.—The Common Hawk Cuckoo.

Blanford, No. 1109 ; *Hume*, No. 205.

Abundant. Two females shot on the 21st June had each a fully shelled egg in the oviduct ; one was unfortunately smashed by the shot but the other was perfect and is now in my collection. The " brain fever " bird, as it is called, is very noisy during the breeding season, commencing to make itself heard in March ; at other times of the year it is very silent. Mir-shikar's name *Barow.*

(141) COCCYSTES JACOBINUS.—The Pied Crested Cuckoo.

Blanford, No. 1118 ; *Hume*, No. 212.

Very common from May to the beginning of October. An egg was obtained on the 27th July from a nest of *Crateropus canorus* containing six eggs belonging to the latter bird. The cuckoo was not seen on the nest but came out of the mango tree on which the babblers had the nest, and the parasitic egg is if anything rounder than the others. I have many times seen *C. canorus* feeding young of this species. Native name *Pupiya.*

Subfamily *Phœnicophainæ.*

(142) EUDYNAMIS HONORATA.—The Indian Koël.

Blanford, No. 1120 ; *Hume*, No. 214.

Abundant. It lays its eggs in the nests of *Corvus splendens* from May to July. I have never taken eggs from the nests of *C. macrorhynchus.* *Re* the number of eggs laid by this species I give the following extract :—

July 7th, 1897—One young Koël.
" 9th " —One young Koël and 3 young crows.
May 19th, 1898—3 fresh Koël's eggs and 1 incubated crow's egg.
" 21st " —1 fresh Koël's egg and 2 incubated crow's eggs.
June 17th " —5 fresh Koël's eggs.
July 2nd " —2 fresh Koël's eggs and 2 highly incubated crow's eggs.

A young bird which I had, used to sit on the whole of its tarsus and swallowed a plantain quite 3 inches long.

(143) TACCOCUA LESCHENAULTI.—The Sirkeer Cuckoo.

Blanford, No. 1129 ; *Hume*, No. 222.

This species is rather rare round Narhar and Jainagar, but Scroope says it is not uncommon elsewhere in the subdivision. Outside this subdivision I have found it common everywhere. I took many nests near Baghownie Factory from April to September. These birds can run very well. They have a habit of running a short distance and then raising their bodies and having a good look round, then off they scuttle again keeping their bodies almost horizontal with the ground. Native name *Soolbool.*

(144) CENTROPUS SINENSIS.—The Common Coucal.

Blanford, No. 1130 ; *Hume*, No. 217 quat.

Very common. Mr. G. Dalgliesh told me they were not common round Dalsing Sarai. It breeds from June to September. In Hume's Nests and

Eggs I see no mention of their building in bamboos, but here they very often do so. Some natives believe their flesh is a cure for consumption. The colours of the soft parts of a nestling were as follows :—Bill, upper mandible dark horn colour, lower mandible and gape yellow fleshing ; iris brown ; legs and feet brownish plumbeous. Native name *Mohoka.*

(145) C. BENGALENSIS.—The Lesser Coucal.

Blanford, No. 1133 ; *Hume*, No. 218.

I have only secured two specimens of this species in the District and seen two others ; it must be very rare. My two birds were shot at Narhar in December and January and are in winter plumage.

ORDER PSITTACI.

Family *Psittacidæ.*

(146) PALÆORNIS NEPALENSIS.—The Large Indian Paroquet.

Blanford, No. 1135 ; *Hume*, No. 147 ter.

I found this species not uncommon round Jainagar but noticed it nowhere else. Two males shot on the 19th January had the testes greatly enlarged and a pair were seen excavating in a large mango tree in the middle of February. They only worked at the hole for a few days and then deserted it. I have never found the eggs or young.

(147) P. TORQUATUS.—The Rose-ringed Paroquet.

Blanford, No. 1138 ; *Hume*, No. 148.

Very common. It breeds here from March to May, but I have found very few nests. Numbers of them, in company with *Columba intermedia*, breed in holes in an old pucca temple at Laheria Serai. Native name *Sooga* or *Tota.*

(148) P. CYANOCEPHALUS.—The Western Blossom-headed Paroquet.

Blanford, No. 1139 ; *Hume*, No. 149.

This species is also common, numbers being seen in the Indian corn and millet fields in August. They also do considerable damage to the paddy. I have never found the nest.

(*To be continued.*)

MISCELLANEOUS NOTES.

No. I.—SOME FURTHER NOTES ON THE NARCONDAM HORNBILL (*RHYTIDOCEROS NARCONDAMI*).

(*With a Plate.*)

At the request of Colonel R. C. Temple, Chief Commissioner of the Andamans, I visited Narcondam, on 22nd March 1901, for the purpose of making further notes on the Narcondam Hornbill and securing more skins. I had also hoped to have found the nest and eggs, but unfortunately the nesting season had not begun.

The birds were paired and the cocks were attentively feeding the hens as they sat together on the trees, but all were still moulting, and from what I noticed I should say that the nesting season would be quite a month later than the time of my visit.

The plumage of those we shot was in a very draggled state, the white tail feathers being dirty and ragged ; and the whole appearance of the birds was as if they had been confined in an ill-kept aviary.

In the description of the bird in the "Fauna of British India," Birds, Volume III, p. 149, and in the notes in the Society's Journal, Volume XII, p. 212, I notice some errors.

In no case have I seen it mentioned that the eye of the female is different in colour to that of the male. The iridis of the cock bird is brilliant orange red with a fine circle of pale yellow next to the pupil—not pale red as stated—and the iridis of the hen a dark olive brown with the same thin circle of pale yellow. The orbital skin is a rich smalt blue, the gular skin the same colour only very much lighter and in places almost white. The "dark brown" markings between the furrows of the casque are due to dirt only, the actual colour being a light brown, of a pinkish shade near the base. The feet are a rich black with a light yellow grasp, and not brown as described, although they turn brown a few days after death ; the claws are brown. The bills seem to vary considerably with the age of the bird, not only with regard to the furrows, but in total length ; those of the female being shorter in proportion to their depth than those of the male.

In the tail of the oldest hen-bird shot, there was one black and white parti-coloured feather.

C. P. CORY, (CHAPLAIN.)

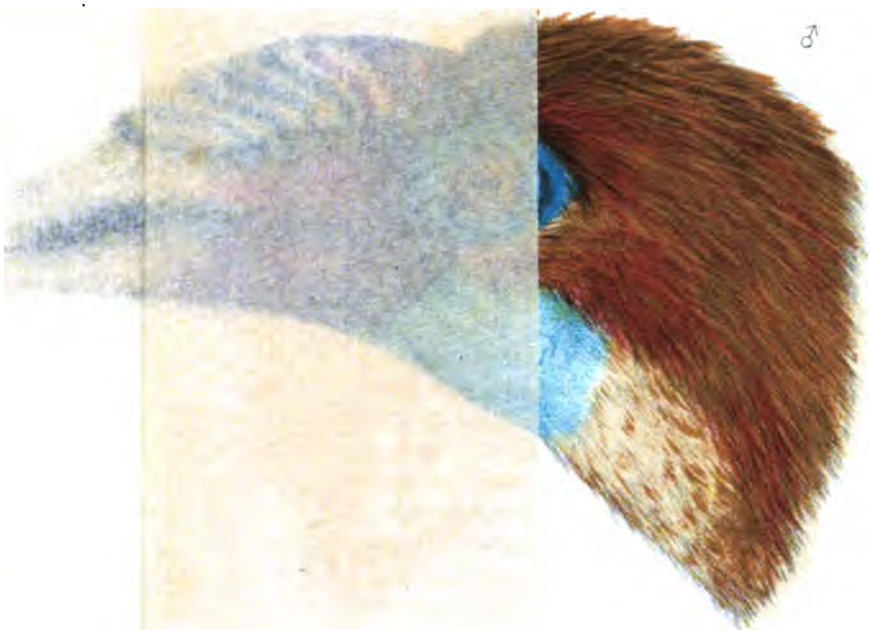
PORT BLAIR, ANDAMANS, 25*th March* 1901.

No. II.—ON SOME DEEP-SEA FISHES COLLECTED BY MR. F. W. TOWNSEND IN THE SEA OF OMAN.

By G. A. BOULENGER, F.R.S.

(*With a Plate.*)

THE fishes listed in this paper were obtained by Mr. F. W. Townsend by means of a fish-trap whilst engaged in cablework in the Sea of Oman between the 21st and 29th October last, and presented by him to the British Museum.



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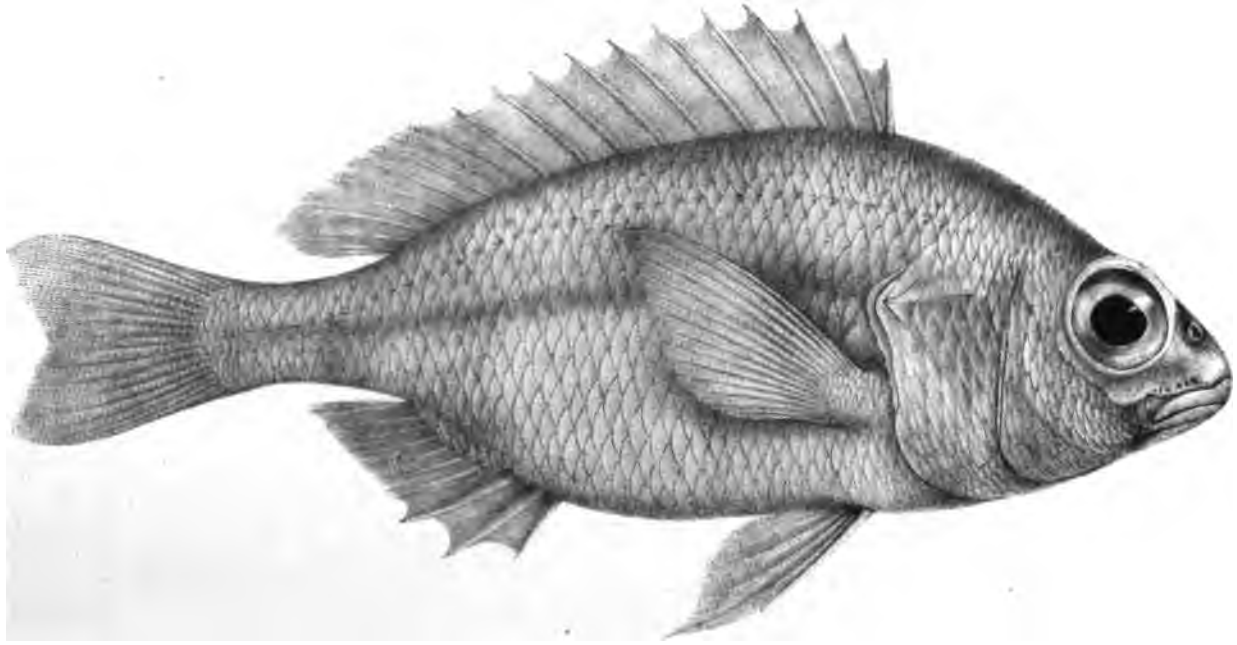

PARASCOLOPSIS TOWNSENDI.

J. Green del et lith.

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The collection, small as it is, is a valuable one, as extending our knowledge of the distribution of the deep-sea fishes of the Arabian Sea and as containing examples of an undescribed form which requires the establishment of a new genus.

1. *Scopelus pyrsobolus*, Alcock.

A single specimen.

Lat. 24° 49′ N., long. 56° 56′ E., 225 fathoms.

2. *Harpodon squamosus*, Alcock.

Several specimens.

Lat. 25° 24′ N., long. 57° 27′ E., 230-243 fathoms.

3. *Uroconger lepturus*, Richards.

Several specimens.

Lat. 23° 56′ N., long. 58° 5′ E., 142 fathoms.

Lat. 24° 5′ N., long. 57° 35′ E., 205 fathoms.

Lat. 24° 21′ N., long. 57° 5′ E., 170 fathoms.

4. *Epinephelus præopercularis*, Blgr.

A single specimen.

Lat. 24° 21′ N., long. 57° 5′ E., 176 fathoms.

PARASCOLOPSIS, gen. nov.

Agrees in every respect with *Scolopsis*, Cuv., but for the total absence of a suborbital spine. *Scolopsis inermis*, Schleg., in which the said spine is feeble, is a link between the two genera.

5. *Parascolopsis Townsendi*, sp. n. (Pl.)

Depth of body equal to length of head, $2\frac{3}{5}$ to $2\frac{3}{4}$ times in the total length. Snout very short, shorter than the eye, the diameter of which is 3 to $3\frac{1}{3}$ times in length of head ; interorbital region flat, equal to the diameter of the eye ; nasal openings large, separated by a dormal flap ; mouth with bands of small conical teeth, outer largest ; maxillary extending to below anterior third of eye ; suborbital and præopercular borders finely denticulated ; a single well-developed opercular spine ; head entirely covered with strongly ctenoid scales. Gill-rakers very short, tubercular, 6 or 7 on lower part of anterior arch. Branchiostegal rays 5. Dorsal X 8-9 ; spines strong, middle longest, $\frac{2}{3}$ or nearly $\frac{1}{2}$ length of head, as long as longest soft rays. Anal III 7 ; spines strong, second and third equal and nearly $\frac{1}{3}$ length of head. Pectoral acutely pointed, $\frac{3}{4}$ or $\frac{4}{5}$ length of head. Ventrals extending to vent. Caudal deeply notched. Caudal peduncle nearly twice as long as deep. Scales strongly ctenoid, 45—48 $\frac{4-5}{14}$; lat. l. 37—42. Uniform reddish, with a more or less distinct silvery lateral stripe.

Several specimens, measuring from 110 to 160 millim., were obtained at three different points :—

Lat. 24° 5′ N., long. 57° 35′ E., 205 fathoms.

Lat. 25° 22′ N., long. 57° 47′ E., 225 fathoms.

Lat. 25° 31′ N., long. 57° 14′ E., 198 fathoms.

6. *Tetraroge Guentheri*, Blgr.

Two specimens.

Lat. 23° 56′ N., long. 58° 5′ E., 142 fathoms.

This species was described from a single specimen obtained at Muscat by Surgeon-Lieut.-Col. A. S. G. Jayakar. The present specimens differ from the type only in having 12 soft rays to the dorsal instead of 11.

7. *Physiculus argyropastus*, Alcock.

Several specimens.

Lat. 24° 5′ N., long. 57° 35′ E., 205 fathoms.

Lat. 24° 21′ N., long., 57° 5′ E., 170 fathoms.

Lat. 24° 42′ N., long. 56° 56′ E., 225 fathoms.

Lat. 25° 22′ N., long. 57° 29′ E., 107 fathoms.

Lat. 25° 31′ N., long. 57° 14′ E., 198 fathoms.

8. *Cynoglossus Carpenteri*, Alcock.

Several specimens.

Lat. 24° 21′ N., long. 57° 5′ E., 170 fathoms.

Lat. 24° 49′ N., long 56° 56′ E., 225 fathoms.

Lat. 25° 24′ N., long. 57° 27′ E., 230-243 fathoms.

(*The above appeared in the Annals and Magazine of Natural History, No. XXXIX, Mar. 1901.*

No. III.—NOTES ON SOME LAKHIMPUR BIRDS.

Within a very short time of the publication of Mr. Baker's notes on his new species of *Corythocichla* I have been lucky enough to obtain two female specimens of the same bird. Both were brought in by Nagas, the first on November 21st, the second on December 1st, 1901. On comparing them with a specimen of *C. striata* also found here a striking difference was noticeable. My birds agree perfectly with that obtained by Mr. Baker except that the white centre to the abdomen is not so large as in the plate.

Another marked feature is the greater slenderness of both bill and feet of *squamata* as compared with *striata*.

The tails of both my birds are ·75″. I noted the colour of the iris in mine as red-brown though the other colours of the soft parts agree minutely with those of Mr. Baker's bird. Both specimens must have been obtained close to Margherita and at no great elevation. Another curious occurrence is that of *Phylloscopus neglectus* which little warbler was identified for me by Mr. Baker who also examined the *Corythocichla*.

Within the last year I have also obtained specimens of *Ptilolæmus Austeni* from the fledgling to the adult stage. The young are, as shown in "Birds of Cachar," far more rufescent than the adults in the upper plumage, and their bills are strongly tinged with green at the base.

An adult female in my collection has curious white striæ in the breast and upper abdomen.

MARGHERITA, UPPER BURMA, 6*th December* 1901. H. N. COLTART.

THE [illegible] PROJECTION
OF
A SQUARE AND ITS PREY

No. IV.—THE OCCURRENCE OF THE WHITE-FACED STIFF TAIL DUCK AT MARDAN.

On 7th December after shooting some duck at one end of a long pond near here, (the one mentioned by Capt. Macnab, I. M. S., in his account of a previous occurrence of *Erismatura leucocephala* in the Society's Journal for April 1900), I saw a single bird swimming and diving in the open part of the pond. Waiting until it dived I ran up close to the edge. The bird came up within 20 yards of me only showing its head and neck, diving again immediately. I saw that it was a stiff-tailed duck at once. The manner of diving was most peculiar, very like the way a porpoise rolls over in the water, or a head and tail rise of a salmon. The bird tucked its head in and turned over showing the whole line of its back tail and legs in succession as it went down. The tail was bent downwards with the legs showing below and the tail, legs, and feet were the last part of the bird seen, showing very clearly as it disappeared. It came up several times only showing its head and neck, the body and *tail* remaining under water. I remained quite still and as it got a little further away it showed more of its body on coming to the surface, and also its tail which was carried at an angle of about 45 degrees to the surface of the water. After watching it for some time I shot the duck. The skin is forwarded for acceptance for the Bird Collection of the Society.

F. J. H. BARTON, MAJOR,
Q. O. Corps of Guides.

MARDAN, 10*th December* 1901.

P. S.—The bird on dissection proved to be a male. Its length from point of bill to tail was 15⅝ inches, from point of bill to end of the legs 16½ inches, both measures between uprights. Colour of bill dull olive green, feet and claws lighter bluish green, webs black. Iridis brown.

No. V.—EXTRAORDINARY MAGNITUDE OF A SNAKE'S MEAL.

(*With a Plate.*)

On the morning of the 27th July, when out snake-hunting in the pine clad hills surrounding this charming little Japanese resort I encountered a snake (*Elaphis virgatus*) in the act of swallowing a leveret (*Lepus brachiurus*).

Wonderful as the magnitude of some snake's meals sometimes are, the disproportion between the size of the captor and its quarry in this case is so remarkable, that had I not witnessed the circumstance I would not have believed the feat within the wildest dreams of possibility. When I disturbed the snake in the jungle the head of the leveret was fast engaged in its jaws distending them and the neck enormously. Handicapped by its excessive burden the snake fell an easy victim to a blow from my bamboo, which caused it to relinquish and disgorge its prey. The leveret had a wound on the near hind limb near the trunk, which I took to be the point of initial seizure. The whole head and this only was covered with saliva secreted during the act

of partial deglutition. The ears lying back over the head were extensively and raggedly windowed in a longitudinal direction almost to the tips, evidently lacerated by the repeated perforations of the palatine or maxillary rows of teeth in their endeavour to secure a further purchase on the aftercoming parts.

The snake which is one of the many kinds of rat snakes, is slender in figure and probably only about a quarter the girth of a python of similar length, or even less. It measured 60⅛" (sixty and one-eighth inches) and weighed 100 mè.* The leveret weighed 235 me' and was thus more than twice that of its would-be consumer.

The accompanying photograph conveys a better impression of the inordinate proportions of the two creatures than any words can do.

F. WALL, CAPT., I.M.S.

ARIMA, JAPAN, *July* 31*st*, 1901.

No. VI.—NATURAL HISTORY NOTES FROM FRYER'S TRAVELS.

The name of John Fryer needs no introduction to an Indian audience, but though we have all met with quotations from him times out of number, the opportunity of reading his celebrated book does not come within the reach of all. It may, therefore, prove interesting to the members of this Society to hear the accounts given by him of the wild animals he met with in India and Persia, which, though they may have no scientific value, are rendered picturesque by their quaint style, and are characterstic of a time when few Europeans had any knowledge of the manners and customs of the inhabitants of the jungles.

Dr. John Fryer embarked on the 9th December 1672 on board the East India Company's ship Unity, of 350 tons and 34 guns, the smallest of a fleet of ten which sailed that winter for the East Indies. By the following June they were in sight of Ceylon, in possession of the Dutch then at war with England, so they had to give it a wide berth for fear of being assailed by the Dutch Fleet. Fryer says: "This is the Island where (if true) the Elephants, are bred, who, transported, exact Homage from all Elephants of other places, and they withal, by prostrating (as it were) their Necks between their feet submissively acknowledge it." But he does not give his authority for this somewhat marvellous legend. The Fleet at the end of June anchored off Machlipatam, in the kingdom of Golconda, where the English, Dutch and Portuguese had factories. A list is given of the wild beasts in the country, leopards, bears, boars, tigers, antelopes, spotted deer and wild lions; though I doubt whether there is any authentic record of lions on the East Coast. A visit was paid to the King's Elephant Stables. "When e came they were feeding out of their Houses on Sugar Canes fresh gathered

* A me' is a Japanese weight and approximately one hundred and twenty me' equal one avoirdupois pound, but it is subject to variation in different parts of the country.

and administered by their Keepers. Alighting from our Palenkeens, they loosed one which was fourteen feet high, and the Black clawing his Poll with an Iron Engine, he stooped down for him to get up, and being upon his Back guided him as he listed. His Body is a Symmetrical Deformity (if I may so say); the Hanches and Quarters clapt together seem so many heaps; his Neck short, flapping ears like Scates, little Eyed, a broad face, From which drops his Proboscis or Trunk, thrusting it out, or shriveling it in, as he chuses; through its hollow he sucks his liquor, and with two Fingers, as it were, reaches the Fodder, shaking off the Dirt against his Thigh, or Vermin, such as Mice, which he abhors, he brings it under to his Mouth, from whence proceed two huge Tusks of Ivory for defence, not Mastication, for which he is supplied within with others; his Tail is curt; he shuffles on with a great Pace, moving all the Joints of his Legs, though the Motion of his Hinderlegs imitate Human Progression, having a Patella or Knee-pan afore, not articulated behind, as other four-footed Beasts are. When he stands, his Legs appear so many Columns, scolloped at bottom, being flat-hoofed. They are of a Mouse-colour. With their Trunks they strike a violent Blow, and are taught to fling Iron Links, to the destruction of their Enemies. That they draw their weighty Cannon is certain; but that they engage with smaller on their Backs I am no Eye-witness." Evidently he had been told that they did, but did not believe it. From Machlipatam Fryer sailed to Madras, and gives us a description of the country round about. "The Country is sandy, yet plentiful in Provisions; in all Places Tops of Trees, among one of which, on the top of a withered stump sat perching a chamelion, clasping with its Claws its rotten Station, filling himself with his Aerial Food; a Banquet which most other creatures else arise an hungred from. But to be confirmed in the Truth of what we have only by Tradition, I caused a Black, who had a bow there to fell him with an Earthen Pellet, which when he had, after a small time he revived, and making a Collar of Straw for his Neck, he carried him to my lodgings, where I dieted him a Month on the same proviand. That he changes his Colours at a constant time of the Day, is not to be contradicted, but whether he live by the Air alone, I will not stand to it, unless there were a Dearth of Flies in the country; though for my Part I did not see him eat any. In Shape he cometh nearest a Newt; with his lungs his Body does agitate its self up to its Neck; he craw's on all Four, and has a Tail longer than its Body, which all together was no more than half a foot; he has Teeth, and those sharp, which makes me think him an Anti-beelubian."

What this long word means is left to his readers to guess. His Black does not seem to have been afraid of the chameleon, but in some parts of India the natives consider it dangerous—in what way I do not know. Journeying to Triblitore, four miles north of Madras, Fryer says: "In the Way hither are store of Antelopes, not to be taken, but by a Decoy made of green Boughs, wherein a man hides himself and walking with this Bush upon his back, gains near on them, while grazing or brouzing rather on Shrubs or Bushes, as to hit

one with an Arrow, when it may be run down with Dogs, the rest of the Herd shunning it. They are of a delicator shape and make than a Deer, the Horns not jagged, but turned as an Unicorn's ; nor spread into branches, but straight, and long, and tapering, rooted on the Osfrontis, springing up on both sides." In September Fryer left Madras, sailing round Ceylon and up the Malabar Coast, where in obscure weather he tells us they were warned by water snakes of their too near approach to the land. Anchoring off Phalapatam, a town north of Mangalore, he sails up a creek in a boat manned by Lascars whom he compares favourably with the English sailors, "who can hardly ever work without horrid Oaths and hideous Crushing and Imprecations ; and these Moormen, on the contrary, never set their hands to do any Labour, but they sing a Psalm or Prayer and conclude at every joint application to it *allah allah*, invoking on the name of God." Those who have rowed up the Bombay creeks in a Bunder-boat can appreciate this description, though the songs here sound somewhat Secular. "The River was full of Alligators or Crocodiles which lay basking in the Sun in the Mud on the River's side, whom the Natives are fearless of ; conceiving the Brachminers have power to lay a spell upon them, that they do no harm. Which, whether true or false, 'tis certain they as seldom do Harm in the Water as the Tigres in the Woods, over whom they fancy their Priests have the same prevalency." A year after leaving England, Fryer landed in Bombay and was received by the Honorable Gerald Aungier, Governor, both for the King and the Company, and President of all the East Indies. An interesting description of Bombay follows, from which it may be gathered that Colaba was then called Old Woman's Island, low and barren, of no other profit but to keep the Company's antelopes, and other Beasts of Delight. A visit was paid to Bandora, then in possession of the Portuguese, whence Fryer and his party travelled all over the Island of Salsette or Canorein. Outside Bandora they used their fowling pieces all the way being presented with rich game, as peacocks, doves and pigeons, chitrels or spotted deer, and close to the ruined city of Canorein they passed through a wood peopled by apes, tigers, wild buffalos and jackals, also flocks of parocket. As the hot weather approached our author was led to moralise on the ingenuity of the Weaver Bird. "In the meanwhile Nature affords us a pleasant Spectacle for the Season, as well as Matter for Admiration ; whereby I know not why we should deny Reason wholly to Animals; unless it be Man having so much, they seem comparatively to have none. For here is a Bird (having its Name from the Tree it chuses for its Sanctuary, the Toddy Tree) that is not only exquisitely curious in the artificial Composure of its Nest with Hay, but furnished with Devices and Stratagems to Secure it Self and young Ones from its deadly Enemy, the squirrel ; as likewise from the injury of the Weather ; which, being unable to oppose, it eludes with this Artifice, contriving the Nest like a Steeple-hive with winding meanders ; before which hangs a Penthouse for the rain to pass, tying it by so slender a Thread to the Bough of the Tree, that the Squirrel dare not venture

his Body, though his Mouth water at the Eggs and Prey within ; yet it is strong enough to bear the hanging habitation of the ingenious Contriver, free from all the Assaults of its Antagonists, and all the Accidents of Gusts and Storms ; hundreds of these Pendulous Nests may be seen on these trees.' After the full moon in August "our Europe Ships, if they save their Passage about the Cape, venture to make in here, by the directions of the Yellow Bellies of the formerly mentioned Water-snakes, who are a warning to them of adventuring too near the Shore, till the open Weather appear." In the cold weather Fryer went to Surat. "To this place," he writes, "belong two sets of Vermin, the Flease and the Banyans ; the one, harbouring in the Sand, fasten upon you as you pass ; where'tis some Pastime to see what Shift the Banyan makes ; being bit by them, he dare not kill them, for fear of unhousing a soul, according to their Notion of Transmigration ; but giving them a severe Pinch will put them to shift for themselves, in a Nest of Cotton-wool. The other Vermins are the Banyans themselves, that hang like Horse-leeches till they have sucked both Sanguniem and Succom (I mean Money) from you ; * * * Hunting of Tigers is sometimes a Pastime, at others a Tragy-comedy; for besetting a Wood where Tigers lurk, with Men and Horses and putting a Set of their loud Musick to strike up in the middle of it ; they rouze at the unaccustomed Noise and rushing forth seize the first in their way, if not shot or launced, to prevent them : Wild Bulls and Buffolas are as dangerous, nor is the Boar less fierce than any of them. Antilopes are set upon by Leopard, in this wise ; they carry the Leopards on Hackeries, both for less suspicion and to give them the advantage of their spring ; which if they lose, they follow not their Prey, being for a Surprize ; Therefore the Hackeries wheel about at a distance, till they come near enough to apprehend them, they feeding fearless of the Hackeries ; then with three or four Leaps, after a small chase, seize them, and easily become their Masters. The great Men have Persian Greyhounds, which they cloathe in the Cold Weather, and some few Hawks ; a Colum may be hunted with a Greyhound, as we do Bustards, being a great Fowl and long in rising. Buffollas animated by their Keepers, fight with great Fury ; their Horns, being reversed, are useless ; but they knock Foreheads with a force adequate to such great Engines, till they are all of a gore, and follow their blow with such vigour, the stronger will hardly permit the weaker to go back to return with his force, but pressing on him, endeavours to bear him down ; then foiling one another they are a long time before they will yield. Persian Rams set together in this manner, are not parted without a bloody Catastrophe, which are kept on purpose for the Sport of their great Men as likewise are Elephants who engage at the will of their Masters." In the English House Fryer saw "an Unicorn's Horn not that of the Rhinoceros of which cups are made and profered for Sale here, and are relied on to discover Poyson if poured into them." Also two skins of Labæan asses streaked with a dark grey upon a white ground, upon the back direct in other parts waving towards their length, and various kinds of piegons (with blubbered

noses, and of a brown colour), tumblers and ponters. By the river a woman had lately been devoured by a crocodile in spite of the Brachmin's pretending to charm them, so that they should do no mischief in their sacred river. "Fish, Oisters, Soles and Indian Mackerel the River yields very good, and the Pools and Lakes Store of Wild Fowl; peculiarly Brand-geese, Colum and Seeras, species of the former; in the cold Weather, they shuning the Northern rigid Blasts, come hither yearly from Mount Caucasus; what is worth taking notice of, is their Aspera Asteria wound up in a case on both Sides their Breastbone, in manner of a Trumpet, such as our Waits use; when it is single, it is a Serass, when double a Colum, making a greater Noise than a Bittern, being heard a great while before they can be seen, flying in Armies in the Air." During Fryer's stay at Surat "a Sea Tortoise was brought to the Fort, in Length Six Feet, the contents of his Hut near two Bushels, reckoning only that part with which his Back is shielded, being an huge Shell of a brown Colour; never to be made transparent as those come from the South Seas are, nor easily to be crackt by any weight; for Experiment, I and two others got upon it, and the Tortoise unconcerned carried us: its Head is loricated with Scales, the Neck reaching as far as the Hut, soft and undefensible: the fins are four, placed instead of Legs, by which it Crawls as well as Swims; the belly is covered with a Breast plate called the Callapee, soft and whitish in respect of the Backpiece or Callipet, its tail is short and wreathed like a Serpent; altogether it is as lovely as a Toad; it sighs like a woman and weeps like a child; being taken and turned on its Back, it is Shiftless. I caused it to be opened and examined its heart, which (countary to the opinion of the Vulgar) is but one, they affirming it to be three, grounded on this Mistake, the Auricles being larger than in other creatures, equalling almost the Ventricles and whole Body of the Heart, which is bigger in proportion than belongs to such an Animal, being as large as an Ox's, which might be the reason of its Pusillanimity; the Veins and Arteries were filled with currents of cold Black Blood; it participates more of Flesh than of Fish, of a viviparous than oviparous offspring, yet lays imperfect Eggs without a Crust (only covered with a Membrane, being most Yolk), buried by it in the Sands, to receive from the Sun's Heat the perfection of their hatching (as the eggs of Egypt from Furnaces, or others from Dunghills): It Spawns them as Fish do, in huge quantities, as much at one time as will more than fill a Saman's Bonnet (every one being as big as an Hen's Egg). By them aboard Ship they are ordered like buttered Eggs of a Fowl, though nearer akin to a Serpent's, hanging together as those do.

"For this end they come ashore, and when pursued, cast up with their Claws a Cloud of Sand to blind their Enemies; when overtaken some are so big four men can hardly turn them.

"It is supposed they feed on the Grass or oaz on Land or at the bottom of the Ocean; and from the Fable of the Three Hearts, springs the Conceit of their Tripartite Community, of fish, and Flesh, and Fowl; the outward Cover-

ing being shelly, the inner Meat Carnous, its way of preserving its kind being by Eggs as the Feathered Fowl do: To me it seems (though the Flesh be highly extolled for the taste and colour of Veal) neither Fish, nor Flesh, nor good Red Herring."

In the winter of 1675 Fryer travelled down the coast visiting Goa, Karwar, and other places. At a village called Mirja he had an adventure with a Snake, evidently a King Cobra. "Being tired and lying to repose on the Bank of the River, under a shady Tree, I was made at by an unsizable Snake which hardly escaped, had it not hissed with an unheard-of Noise before me, which, rouzing me, made me shift its speedy Course, as it angrily gathered up its Body, and darted itself into the Flags on the River Side; these Creatures are dreadful to the inhabitants, and when I related my hazard, they wondered I came off so, there being of them big enough to master the largest Animals. After my Danger was over, I was told she had a Nest in that place, it being lately turned into a Burial-place; here, by the by, might be noted what Pliny writes, to wit, that Snakes are generated out of Human Brains putrifying." At Karwar meat apparently was scarce, no beef or mutton was obtainable and if they required flesh or fowl they had to get it themselves. Water-fowls, peacock, green pidgeons, spotted deer, sabre, wild hogs and sometimes wild cows formed the bag on their shooting excursions, and a strange adventure with a tiger is related. "One of our Soldiers, a youth, killed a Tigre-Royal; it was brought home by Thirty or Forty Combies, the Body tied to a long Bamboo, the Tail extended; so, they brought it to the House, where we saw 'twas wounded in Three places, one through the Head with Two Bullets, another through the Body slanting up to the shoulders, a third in the leg; it was a Tiger of the Biggest and Noblest Kind, Five Feet in Length beside the Tail, Three and-an-half in height, it was of a light yellow, streaked with black, like a Tabby cat, the Ears short with a few Bristles about the Lips; the Visage Fierce and Majestic, the Teeth gnashing, Two of which she broke against the Stones for Anguish, the Shoulders and Forelegs thin and well-set, the Paw as large as the biggest Fist stretched out, the Claws thick and strong

"The Boy shot it in the night from a Chouse or Estarzo, as it came to drink supposing it to have been a Deer; the first shot was that under the Shoulder, which made her spring three times an incredible height, at the last of which she fell into the Chouse, from whence she shaw the Flash, where with the English Boy were a Comby and a Comby Boy of eight Years old asleep a little on one side; she pawed the Stem with her Feet, while all but the Child asleep fled; but being wrung with her Pain, she soon left the place with an horrible Noise, that made the Woods tremble, all which awaked not the Lad, nor had it any Harm.

"In this interval, the English youth charged again with a couple of Slugs, and tracing the Blood, as she was making at him, discharged through the Brain-pan, at which she was quiet; but to make sure, he made another Shot at her which he believed was that in the Leg; all this time the Moon was obscured

and cloudy ; the Combay that had left him and his Son, at length came with many more, calling *Fringi*, the term they have for Europe men and Franks ; the Boy was walking about fearing to venture within reach, till at last laying aside his well-advised suspicion, he approaching, found the Terror of the Wood slain.

"Disrobed of its Royal Hide, two Bones of the bigness and Figure of a Levator presented themselves to our view, that had no connection with the other Bones, but wholly immersed in the Flesh, in the ends of each Pectoral, and the three circumducing Muscles, towards the joining of the Shoulder-blades, and the upper Bones of the Fore-feet, commonly called Shoulder-bones ; of these there goes a story handed by tradition, as that licking the Right Shoulder it appeases Hunger, the Left it whets it where these Bones lie ; but-probably enough it is, that Nature added these for its greater strength ; the Entrails were little variable, but the Heart was mighty, and the Liver (they say) had as many Lobes as that was years old, which were six and-an-half, like to a Foxes."

The chief commended the lad for his courage, and according to custom, plucked off his over-coat of venetian cloth of silk and silver and gave it to him. We are then provided with some curious information about the tiger. 'It is memorable what is attested, by these Woodmen, of the Tigre, that when he intends to prey on the Monkies, he uses this Artifice or Stratagem ; the Monkies at his first approach give warning by their confused chattering, and immediately betake themselves to the highest and smallest Twigs of the Trees when the Tigre seeing them out of his reach, and sensible of their Fright, lies constant under the Tree, and then falls a Roaring, at which they trembling let go their hold, and tumbling down, he at leisure picks them up to satisfy his Hunger ; they are his accustomed Repast, seldom making Man his Meal, and they are judged (as St. Paul's Barbarians did him) guilty of some Horrid Crime that such vengeance overtakes ; the Woods and Mountains yielding variety of other Food. The Tigre is dull-scented, and not long Nimble, Three Leaps tiring him, otherwise it's probable he would make more havock than he does. The She brings forth but once in Twelve Years, and then but a single Cub ; thus has Providence suppressed the growth of this Masterless Creature ; besides, if the proverb be true, the Bitch brings forth but once in her Life, or very rarely more, notwithstanding Œlian says otherwise in his 4 lib de Historiâ Animalium. Panthers were more common than tigers, and apes were plentiful, but the natives considered it "Piacular" to kill these, calling them Half Men, and saying that once they were Men, but for their laziness had Tails given them and hair to cover them. Which agrees with the theory of the latest Professor on the subject. The Indian tigers, we are told, was the fiercest in the world, but the Lion was feeble and cowardly.

The next year Fryer sailed up the Persian Gulf to Gombroon or Bunder Abbas, and travelled up to Ispahan, the capital. The Emperor kept a varied collection of wild animals, and here Fryer first saw the rhinoceros ; "a cruel

Beast, of a large size, there coming from his Nose an Horn a Cubit long (brown towards the Bottom, Whiter near the Point) and Six inches Diameter, whence the derivation of his Name from Rin, Nasus, a Nose and Kéras Cornu an Horn; between this Animal and the Elephant, is a mortal Strife, for which Nature seems to have Armed it on purpose; it being a four-footed Beast, with Three Partings of the Hoof, built on thick strong Thighs, but short, considering the great bulk of its Body which presses them; it is Tall enough to reach the Bowels of its antagonist with its Horn, with which it Gores him to Death; nor has she given him less firm Bones to the Trunk, if by chance it should be crushed by the Elephant, defending its very Hide with a Coat of Mail; wherefore before on the Neck and Shoulders, and behind in the Quarters, the Skin lies in folds, like Fish Scales over one another; the Face bears much of an Hog's Countenance, unless the upper Lip which resemble a Cow's, and the lower, the form of a Whale's; the Mouth discovers a mishaped tongue, set about with two rowes of Teeth; it is of the same Mouse colour, and Tailed as an Elephant is, and Feeds of the same Fodder and is kept facing too mighty, but lean Elephants.

"Whether the Rhinoceros be the Unicorn, I suspend my belief, since I have seen a Horn turned with Furrows and Ridges from the Basis to the Point, and Tapering like that of our King's Arms, but what Petrus Angelius relates concerning the Avager or Indian Ass can have no congenity with this." A quotation from this author is given, "The Wild Asses of India are as big or bigger than Horses, whose Heads are of a Purple die, their Eyes Blew, the rest of their Body White; on their Foreheads they have an Horn a Cubit in length, whose lower part for Two Hands breadth is White, and the top, which is sharp, inclining to a Bright Red, but the Middle Part is blood Red; of these they make cups out of which whosoever drinks, neither Cramp nor Falling Sickness seizes them nor has any manner of Poison any force, if that immediately before or after taking the same, either water, wine or other liquid thing be taken out of these cups." However Fryer thinks that the Rhinoceros, which come from Bengala, and are esteemed terrible and indomitable creatures, must be (or more) what Petrus calls Asses, there being no other beasts in those parts with but one horn. In some artificial lakes were flocks of water-fowl which the Persians were skilled, by their long case-hardened guns, to shoot flying. Hawks of Muscovia were purchased at great rates "nor undeservedly, for they will strike down these Colum that are big as Wild Turkies, and visit India in the Cold Season, eleven or a dozen one after another, as they fly in Train like Wild Geese, and come down with the last themselves; they have some Hawks of their own, but they are of a Cowardly Breed to these."

On the journey back to the coast "we met a Lion and a spotted Deer, carrying up as Presents to the Sophi from the Mogul; the Lion seemed rather a Catamountain than such a Majestick Creature as ours in Europe being nigher a Dun colour than a Dark Red, without Beard, nor haired all from the Head down to the Crest and Thighs; about the Lips it had Bristles

like a Cat, and when the keeper stroaked it, it would make a noise much the same as a Cat when she purls : These are kept to set upon Bulls before the Emperor, which they do sneakinly, coming behind to leap upon their quarters which one of our right bred English Mastiffs would scorn to do ; a true Bull Dog being too hard a Match for one of these Lions, which has often been proved at the court of Persia to the commendation of their courage." When Fryer left Ispahan the Company's Agent remained behind, waiting for a favourable opportunity to appear before the Emperor, which was a thing of great difficulty and expense to the Company, it seldom costing less than a thousand Thomands in fees and presents. "The Irish Buckhounds brought up for that end were admired and talked of by all, and represented to be as big as Camels ; and though they were young proved swift Creatures, I seeing the Bitch in our journey turn an Antelope, which none of their Hounds ever came near ; and had the dog been yare, no doubt but they had seized it." The dog, too, had a sense of humour as the following story related by Fryer goes to show. Being let loose one day, "he rambled about the Caravan for what he could get to satisfy his Hunger ; whilst an Hodge (one of their Pilgrims to Mahomet's Tomb) who was at his devotions on the most conspicuous place of the Ser Raw (they loving to be seen of men) had placed a Bowl of Buttermilk tempered for his Tooth, ready by him, to fall to after his prayers ; he bowing his Face to the ground, as their custom is to worship and there lying prostrate : the Dog scenting the Bowl, mounted the Quadrangle and clapping one Leg on the neck of the Hodge, kept him in that Posture, while he had made cleaner work than the Pilgrim, who for fear durst neither stir nor cry out, lest he should provoke so terrible a Monster to devour him ; but silently passed by both the affront and the Loss ; while in the meantime it was occasion of much laughter to the whole Caravan Ser Raw to behold the man of lofty Thoughts of his own Purity, thus handled by the Beast, and none offering to step in to his rescue, till we had called him off ; for which the Hodge thought himself obliged to return us Thanks, for delivering him from so great danger." The sheep of the country were prodigiously large, trailing tails after them, of the weight of thirty pounds full of fat, especially after the vintage and the cotton harvest, when they fed on the leave and tender branches of the vines and gathered up the scattered seeds of the cotton. "Their Horses though they have degenerated from their Primitive Race still are the best of all in the East, unless the Arabians be preferred for swifter Courses and light Horses ; however for charging Horses, and stout warlike Steeds, they are valued above all others."

On his return to Bombay one of the Mogul's generals, the Governor of Jeneah (now a town in the Poona District) having need of the service of a doctor, Fryer was commanded by the Hon. Gerald Aungier, to set forth for that place. Leaving Bombay at three in the afternoon on St. George's day, he anchored at nine that evening below Thana. The next morning, he proceeded up the creek, the banks of which were low and fruitful and

on both sides were placed stately Aldeas and Dwellings of the Portugal Hidalgos till within a mile of Kalyan when Sivaji's country was entered. Leaving thir boat at Kalyan, they proceeded across the Konkan to the ghaut leading up to Ambagaon and thence to Jeneah. The Governor's wife was the patient who required Fryer's attendance and luckily his treatment met with success though he only had a hand thrust through a curtain whereby to diagnose the case. The first hand given to him he declared to belong to a sound body, whereupon he was told that was an ingenious device to try whether he knew anything about his profession. When the rains were close at hand he set out on his return journey and one evening entered on a wood "which deluded us with false flashes, that you would have thought the Trees on a Flame, and presently, as if untouched by Fire, they retained their wonted verdure. The coolies beheld the Sight with Horror and Amazement and were consulting to set me down, and shift for themselves; whereof being informed, I cut two or three by breaking a vein, let Shitan (the Devil) out, who was crept into their Fancies and led them as they do a startling Jade, to smell to what their wall-eyes represented amiss; where we found an Host of This, the subject both of our Fear and Wonder, which the sultry heat and moisture had generated into Being the certain Proximus of the ensuing Rain, which followed us from the Hills.

This gave my thoughts the contemplation of that miraculous Bush crowned with Innocent Flames, that gave to Moses so pleasant and awful a Prospect; the Fire that consumes every thing, seeming rather to dress than offend it.

Thus we came to Bunta, a despicable Country Town, seven course more; it is in the possession of the Coonbies, who are not strong enough to aid their Herds against the devouring jaws of the wild Beasts, a Young Buffola being seized the night before, out of the Tabernacle they lodged me in; wherefore they cautioned me to keep Fires all Night, lest the Horse might lose one of its Quarters, or our oxen might serve them for a supper; I added to the Fires a strict watch, whose mutual answering each other in an high Tone, was deafened by the Roarings of Tigers, cries of Jackals and Yellings of Baloos, or overgrown wolves." In another passage Fryer again refers to "Balus, a sort of wolf." This is an interesting corroboration of Mr. W. G. Betham's note on the Kol-Balu which will be found at page 747 of Volume XI of the Journal. Messrs. Eardley Wilmot and Wallinger had met with Jackals which uttered the peculiar cry of the Kol-Balu, but Mr. Betham one morning put up these animals which uttered the same cry, but were certainly not Jackals; they were reddish, not so red as a wild dog and had reddish bushy tails.

From the passage quoted above, the natives evidently knew of an animal of the description which they called Baloo.

In August, 1682, Fryer landed in England after a voyage of seven months which though tedious "we passed away merrily with good wine and no bad Musick; but the Life of all, good company and an honest Commander; who

fed us with fresh Provisions of Turkies, Geese, Ducks, Hens, Sucking Pigs, Sheep, Goat, and to Crown all, the Day we made England, killed us a fatted calf." I doubt whether we fare so well now-a-days.

N. C. MACLEOD.

BOMBAY, *Nov.* 1901.

No. VII.—OCCURRENCE OF THE AVOCET (*RECURVIROSTRA AVOCETTA*) NEAR POONA.

Barnes remarks that the Avocet does not occur in the Dekhan. As I saw one near here yesterday, the fact is worth recording. I endeavoured to shoot it, but was unsuccessful. In my own mind I have no doubt of its identity, as it is hardly possible to mistake its general white plumage and the upturned bill. I found it on the muddy bottom of a fast drying up tank in company with other waders, a few teal and snipe. It gave me one or two opportunities of bagging it, when I was hoping to get a teal, but, as soon as I secured my attention to it, it seemed to take in the altered conditions and after flying round, out of range, two or three times, it made a bee line for another tank.

R. M. BETHAM, MAJOR,
8th Bombay Infantry.

POONA, 20*th January* 1902.

No. VIII.—A NOVEL METHOD OF CATCHING A JACKAL.

The following novel method of catching a jackal may be of interest to members :—

This morning some of the sepoys of the regiment attracted by a clattering of tin and whines, followed up the noise and found a jackal with his head so firmly jammed into an old tin which had contained ghee that he could not get it off. The whole head was buried in the tin, and the animal was quite blinded and powerless, so he was rapidly secured and brought to the mess for inspection.

The tin had been left lying in one of the cooking places just outside the parapet of the camp.

D. THOMSON, MAJOR,
28*th Bombay Pioneers.*

CAMP KHWAJA KIDDER, KOHAT,
22*nd January* 1902.

No. IX.—TRAVANCORE SNAKES.

In 1895 a list of snakes taken in Travancore appeared in the Society's Journal containing fifty-eight species. To that number I have now to add nine more species taken since that date.

Gongylophis conicus.—This snake is only found in the extreme south, where it is fairly common about Nagercoil and Cape Comorin.

Platyplecturus madurensis.—A single specimen taken on the Cardamom Hills at about three thousand feet elevation.

Ablabes calamaria.—Also a single specimen taken on the Kanan Devan Hills at five thousand feet elevation.

Tropidonotus monticola.—Found at Vembayam in the low country ten miles from Trevandrum, also at Pirmerd at three thousand feet elevation.

Chersydrus granulatus.—Taken at sea by the fishermen at Trevandrum.

Dryophis pulverulentus.- A single specimen taken by Mr. O. H. Bensley at Pathanapuram in the low country.

Callophis bibronnii.—A single specimen taken two miles from Shencottah at the foot of the eastern side of the hills.

Hydrophis spiralis.—Taken by the fishermen at Trevandrum.

Distira jerdoni.—Taken by the fishermen at Trevandrum.

H. S. FERGUSON, F.L.S.

TREVANDRUM, 24*th January*, 1902.

No. X.—SANDGROUSE IN NORTHERN GUJARAT.

Some time ago I wrote you a short note regarding the abundance of sandgrouse, both the common (*Pteroclurus exustus*) and painted (*Pterocles fasciatus*). Several sportsmen and others, who have known this locality for some time, fully agree with me as to the fact that the numbers of these birds, but specially of *P. exustus*, have increased largely during the past two or three years.

On thinking over the matter I have come to the following conclusion regarding their increase. Both the abovenamed species breed more or less all the year round, except, perhaps, for a month or so during the rains. That their numbers are kept down in ordinary years is no doubt due to their enemies, *viz.*, jackals, foxes, and birds of prey, which must account for vast numbers of eggs and young. During the famine of 1899-1900, the foxes and jackals almost disappeared from this portion of the country, a considerable number being doubtless killed or eaten by Wagaris and other aboriginal tribes. The usual seasonal visitants among the birds were almost entirely absent, many of the permanent residents partly disappeared, and consequently the birds of prey went elsewhere.

The removal of their natural enemies has thus, I think, directly led to the increase of sandgrouse. I notice that the kangaroo rats (*Gerbillus hurrianæ*), and to some extent hares, which have the same natural enemies, have increased considerably. As regards the sandgrouse, as I am about to leave Deesa, I shall not be able to observe whether their numbers are reduced during the next few years, but I notice that in the last six months foxes and jackals have increased considerably, although birds of prey are not as numerous as usual, owing to the partial famine from which the country is at present suffering, and I shall not be at all surprised to hear that a few more years have reduced the sandgrouse to the normal number.

While on this subject, I should like to record that a specimen of the pintailed sandgrouse (*Pteroclurus alchata*) was recently shot near here by Capt. L. Oldfield, R. F. A. He informs me that it was one of a flock of 20 or 25 which came down to drink somewhat earlier than *P. exustus*. I have heard that others have also been shot, but Capt. Oldfield's is the only one I have actually seen. I believe that this species has never been previously recorded from anywhere so far to the south-east.

P. arenarius (the large sandgrouse) have visited us this year in small numbers, and thus we get four species, viz., *P. exustus* and *P. fasciatus* permanent residents, and *P. arenarius* and *P. alchata* occasional cold weather visitants. I have never heard of the spotted sandgrouse (*P. senegalus*) being obtained here, but they are common cold weather visitants to the Runn of Cutch and other localities not far distant, and it is quite possible that a few may sometimes reach Deesa.

C. G. NURSE, MAJOR,
13*th Bombay Infantry.*

DEESA, 2*nd February*, 1902.

No. XI.—TIGER NETTING IN MYSORE.

Referring to the shooting trip of some visitors to the Mysore jungles, a local paper recently had the following remark:—"It is reported that the tigers have been netted for their sporting delectation, but we must refuse to believe that the distinguished shikaris will tolerate sport of this kind," and it is probable that, in spite of what Sanderson and others have written, there is still a good deal of misconception about tiger netting, as pursued in Mysore, which is a genuine native sport, well worth witnessing by any one interested in wild beasts and their ways. As Sanderson says: "This is the only method by which they can be brought to bay where the cover is too continuous to be easily driven. It may seem unsportsmanlike to shoot a tiger through a net, but as far as danger goes there is, perhaps, as much as in shooting him from a tree." Obviously the fact that the tiger cannot escape takes away the sportsman's pride in his shot, and the man with the rifle feels that he is playing only a subordinate part in the game, but even so the shooting is not easy, and killing a netted tiger is not a case of potting a beast pegged out on the ground like the lion in the familiar picture in Æsop's Fables, though this might be supposed from the comments sometimes heard.

The method of enclosing the beast is as follows:—When a tiger is to be caught, the villagers are warned to be ready with their nets, and a buffalo is tied up in a likely jungle. On a kill occurring, the nets are sent ahead a quarter of a mile or so from where the tiger is supposed to be lying up, and erected in a crescent-shape across the line which the beast must take when driven. The nets, of which every village in these parts keeps its own stock, are made of stout rope with a large mesh, and run up to 40 feet in length with a depth of 12 feet, and the line will often extend to a quarter of mile or more, reaching right into the open country on either flank. Care is taken to place

the nets immediately behind a considerable patch of the very densest thickets, and the consequence is that when the tiger is driven forward by the beat and reaches the net, it almost invariably lies up in the thicket instead of trying to break out with a charge. Men who have been posted on trees signal the moment when the animal has reached the right spot, and immediately the two wings close in from behind and complete the circle of nets, using spare lengths if necessary. Next comes the work of making the enclosure secure. Spearmen are placed at close intervals all round to repel the tiger should he meditate a charge, and the nets, strongly fastened to the ground with pegs and heavy logs of wood, are connected by the main ropes with the trees and, inclining slightly inwards, are supported at a height of 9 or 10 feet by forked sticks stiffened with an interlacing of branches and thorns. A barrier is thus formed, too strong and too elastic to be torn up or broken through by the charge of any tiger. If the animal is to be caught alive, nothing more has to be done but to introduce a trapdoor cage baited with a goat, and wait till hunger compels the tiger to enter ; but if it is to be shot, the circumference of the nets is contracted till rather less than an acre of jungle is enclosed Then begin the preparations for the shoot. As I have said, the jungle inside the nets is necessarily of the thickest, and diagonal tracks, 10 to 20 feet in breadth have to be cut in order to render the tiger visible when moved. For this work a party of some twenty picked spearmen enter the enclosure and form a ring round, a like number of men armed with long handled choppers, a few others with horns and tom-toms accompanying. The task, at close quarters with the beast, looks highly dangerous, and the sportsman, who is not content to wait outside the net, may enjoy a certain amount of sensation by joining the cutting party. It might be imagined that the tiger or tigers (in one case there were four), maddened by rage, hunger and thirst, would seize the chance for a charge, and every now and then, in some particularly thick patch there is a thrill of excitement, when the spearmen stand alert with lowered points and the tom-toming is redoubled, but a charge has never been known, for, no unwounded tiger, and, in my opinion, no wounded one either, would face such a compact and noisy body while there was any way of retreat. When the cutting is finished the men with rifles take their stand outside the nets on *machans*, which command the clearings, and the beaters try to drive the tiger from one block of jungle to another by shouting and rockets. Needless to say, the beast when he moves at all does so at a gallop, and, judging from the amount of missing, which generally occurs, it takes a quick shot to stop the animal when crossing a narrow opening in a large enclosure. The beast may have to make its dash several times before it is killed, and the chief interest to the sportsman is the magnificent spectacle of the angry tiger at large, which ordinary methods of shooting give few and short opportunities for seeing. If the patches of jungle left after cutting are very thick, it is sometimes impossible to make the tiger move and on one occasion we had to give it up at night without getting a shot,and went away with the intention of

cutting more of the bushes next day. During the night a tiger always moves round the enclosure and makes many a desperate charge at the net, which is repelled by the spearmen who are on guard by their watch fires at close intervals. On the night after this unsuccessful attempt at moving him, the tiger, an exceptionally large one, evidently gauged the situation and knew that a supreme effort alone would save him. Accordingly, about 5 A.M., when the shikaris, tired with the work of the previous day had dropped off asleep and the fires had burnt low, the tiger crept up to the net and jumped clean over it, pitching right on the top of two of the watchers. When we arrived early in the morning, the truth of the story was proved by the hairs on the top of the forked stick where the beast's stomach grazed the net, by the marks where he pitched, and by the two villagers, both of whom were considerably mauled. The net at the spot was nine feet high and sloping inwards, while the take-off was slightly up-hill and out of thick lantana bushes, so that the leap was a fine one, but the fact that it should have been attempted at all, is still more remarkable, for all the natives bear out Sanderson in his statement that tigers never attempt to jump over the nets, and this is the only instance of such an escape known of in Mysore.

On the last occasion that I was out, the hunt was got up to catch a man-eater which had inspired such terror in the neighbouring villages, that quarrying there for the new Palace Buildings in Mysore was stopped, the toddy drawers petitioned that they were afraid to work, carts would not pass through, and the annual festival at the local temple was abandoned. As the doings of veritable man-eaters are always a subject of interest I will detail the two cases where men were killed, about which I obtained the official reports. Other subsequent cases were mentioned, but not verified by me.

(1). On 16th November last two villagers, Ranga and Subba Setty, went into the jungle in the morning to collect roots. Ranga stood preparing snuff, and Subba Setty was cutting creepers close by, when Ranga saw the tiger coming towards him and fled. The tiger pounced upon Ranga and dragged him into the bushes, where the Police, to whom the matter was reported, found a few bones and the clothes of the deceased two days later.

(2). On 22nd November last, one Kare Gowda took his bullocks to water at a pond in the jungle. His father-in-law soon after saw the bullocks dashing back to the village in alarm and went to look for Kare Gowda, but not finding him at the pond, returned to the village and took out a party to search. Bits of his clothes, blood, the signs of a struggle and the foot-prints of a tiger were found, and three days later the Police came on a few bones further on in the jungle. Tales were told me of the tiger having attacked parties bearing corpses to the burning ground and carrying off the corpse, and the acquisition of such a curious taste, may perhaps be explained by the following passage in a letter from the Amildar :—

"It is a custom among the villagers here not to burn or bury the dead bodies of pregnant females, but to expose them in the neighbouring jungles to

be eaten by vultures and wild beasts. The body is tied to a tree in a sitting posture and a pot of water is placed close by. Not long ago some cow-herd boys came across the dead body of a woman tied to a. tree as described and noticed the foot-prints of a tiger round it, but the body was untouched. The boys cut the rope binding the body, which fell to the ground, and the next day the corpse was found eaten away by the tiger." This I give for what it is worth, but the custom described deserves mentioning.

To return to our nets. When we got out to the enclosure we were told that there were two or more tigers inside and, to cut the story short, two were killed that day, and two, on clearing more jungle, the next. There was one male tiger, 8 feet 7 inches in length, and the other three were young tigresses. running from 8 feet to 8 feet 5 inches; in fact, as it seemed, a party of brother and sisters. Whether any of these was the veritable man-eater it is impossible to say, but they were certainly caught in the jungle close to which the men were killed, and it is not very likely that there was a fifth.

One of the tigers, I may mention, was wounded and had to be walked up inside the enclosure. On this occasion it was too maimed to charge, but there is always the possibility of excitement over a wounded beast which cannot be otherwise finished off. Sanderson describes how the villagers sometimes kill the tiger for themselves with spears, which must be a fine sport to witness, but I fancy this is seldom done now-a-days, when the netting is chiefly carried on by the direction of H. H. the Maharajah on special occasions only, to catch tigers alive for his own magnificent collection at Mysore and to present to the London and other Zoological Gardens, or to provide shooting for his visitors. Any one who has been present, whether the young sportsman who wishes to become familiar with the sight of an angry tiger, or the old shikari who has slain the beast by the usual methods, will equally agree that Tiger netting in Mysore is an interesting experience, and well-worth witnessing.

S. M. FRASER, I.C.S.

MYSORE, 18*th February*, 1902.

No. XII.—BIRDS COLLECTED IN HYLAKANDY, CACHAR.

ZOOTHERA MARGINATA.—The Lesser Brown Thrush.

Hume, Cat. 350 bis.; *Oates*, No. 705.

I have a single female skin in my collection collected at Roopachona. This is the only one I have ever come across.

MICROHIERAX MELANOLEUCUS.—The White-legged Falconet.

Hume, Cat. 20 bis.; Blanford, 1268.

I entered this species as *fringillarius* in my list but it must be altered to the present species. I sent my skin to Mr. Stuart Baker and he kindly corrected my identification.

CHAS. M. INGLIS.

BAGHOWNIE FACTORY,
DARBHANGA, 18*th February*, 1902.

No. XIII.—THE MASKED FIN-FOOT (*HELIOPAIS PERSONATA*).

I have just received from Mr. Primrose a male specimen of this rare bird. It was shot by Mr. Ross at Monierkhall in Cachar and the skin was given by him to Mr. Primrose, who has very kindly passed it on to me. Mr. Baker in his "Birds of Cachar" says he has not come across it, so I think this occurrence deserves notice.

BAGHOWNIE FACTORY, CHAS. M. INGLIS.
DARBHANGA, 19*th February*, 1902.

No. XIV.—NESTING OF THE COOT (*FULICA ATRA*).

(1.)

Major R. M. Betham in a note in this Journal says:—"and should like to know whether any other ornithologists have found this bird breeding in India excluding Cashmere." I got a nest with six highly incubated eggs in some water at Belahi Factory in the Mozufferpore District on the 30th July 1896. I was only able to save two of the eggs and they are very disreputable specimens. Mr. Harrington Bulkley, however, has very kindly given me 3 eggs, which he collected last August.

BAGHOWNIE FACTORY, CHAS. M. INGLIS,
5*th March*, 1902.

(2.)

As I do not think either Messrs. Baker or Inglis mention the occurrence of the common Coot (*Fulica atra*) in their respective articles the "Birds of North Cachar," and "Birds collected in the Hylakandy District" I think it perhaps worth noting that I came across it on two or three occasions in the Chutla bheel; and have had a specimen, shot here, brought me by my collector a few days back—this was a female, with eggs well defined. This will I think, show that it occurs, perhaps sparingly, both in Cachar and Sylhet.

A. M. PRIMROSE.

CHANDPUR BAGAN, P. O.,
SOUTH SYLHET, 29*th March*, 1902.

(3.)

Major Betham in his notes on the nesting of the Coot near Poona asks for information as to its breeding in other parts of India. I am under the impression that it breeds freely in most parts of the Madras Presidency. I have found nests in several places in the Cuddapah District. In 1892 I found a nest in a small tank near the town of Cuddapah on the 30th of September. It contained three eggs, hard set. On the 30th of October of the same year I found several nests in a small, reedy tank at Occhaveli, containing fresh eggs. There are evidently two broods, for I have seen a clutch of young birds following their parents on a tank early in April. I was particularly interested in the sight, for a couple of Brahminy kites that were sailing overhead made repeated, but ineffectual, attempts to carry off the chicks. Again and again they swooped down to the water, but the little

things were ever on the alert and were safe under water before their enemy reached them. The old birds showed great indignation and rushed to and fro with ruffled feathers, hissing and flapping their wings.

W. HOWARD CAMPBELL.

GOOTY, MADRAS, *24th March*, 1892.

No. XV.—OCCURRENCE OF THE SHELDRAKE (*T. CORNUTA*) AND THE GOOSANDER (*M. CASTOR*) IN THE DARBHANGA DISTRICT, TIRHUT.

I have received males of both species got by Mr. Edgell on the Suwasingpur chaur near Shahpur oondie, in this District. He says they were got about 'Xmas time; and that once before he saw three Sheldrake on another large chaur called the Baraila.

CHAS. M. INGLIS,

BAGHOWNIE FACTORY,
6th March, 1902.

No. XVI.—NOTE ON THE HABITS OF *RALLINA SUPERCILIARIS*, SHARPE, AND *GORSACHIUS MELANOLOPHUS*, BLYTH.

Seeing a note on the Banded Crake by Major Betham in the last number of the Journal (Vol. XIV, No 1, p. 180) has reminded me of the fact that we have made a discovery here in Kanara which is sure to be of interest to ornithological readers. H. L. Hervey and I discovered the nest and eggs of *Rallina superciliaris* in the month of August 1898; to be precise, on the 8th of August 1898.

A "kunbi," or aborigine of the place, brought H. the news that there was a nest with large white eggs in a bush at a place called Binghy, within a few miles of our head-quarter station. We both went out and were much exercised in our minds at the sight of the nest: a more or less round, untidy structure of dead leaves and a thin twig or two, with a slight concavity in the centre, placed in a low bush in scrub jungle on flat ground, surrounded by high hills on three sides, within a mile of the sands of the seashore. The nest was well hidden by the foliage of the bush and was placed on the thin interlaced branches about two and-a-half feet from the ground; there were six white eggs in it of a slightly creamy shade, with a slight gloss and fine texture. We had provided ourselves with a gun and cartridges each and sat down, one on each side of the bush in hiding, to wait for the bird, which had left the nest immediately it caught sight of us coming. We had not waited long before we were rewarded with the sight of a Banded Crake that came sneaking out with much circumspection from some thick jungle close by. The bird spotted H. the first time and disappeared in a second. We changed our places slightly and shot it the second time it appeared. It was a female in full male plumage.

H. L. H. was Judge for four years in the same station where I am, and during that time we collected eggs assiduously with very satisfactory results and gathered a great deal of information of interest about birds, which we intend to publish some day in the near future. We found that the Banded Crake was a fairly common bird in the jungles along the coast during the monsoon ; and we obtained altogether some dozen nests with eggs varying in number from four to seven in the clutch, besides finding many empty ones. All the nests with eggs were found in the months of June to September, *i.e.*, during the heavy rains. Many nests were found robbed of their contents by mongooses, &c., the empty egg-shells lying on the ground below, some few there were in which the eggs were rotten. The nests are placed in bamboo clumps, on creeper-masses, on the top of a tree stump, &c., and were at the most six feet from the ground. The size of the egg is about 1·30″ × 1″ on an average ; one of the largest out of a series of 50 measures 1·40″ × 1·20″. The birds breed in the densest jungles as well as in the scrub jungles, from sea level up to the tops of the highest hills which are here about 1800 feet.

Mr. Davidson noticed this bird first in Kanara as mentioned in his *Birds of North Kanara*, in Vol. XII, p. 60 of this Journal. What he says there about its habit of calling in the mornings and evenings is correct ; but it calls at other times during heavy, misty weather. The cry is rather like that of the common hen after laying an egg ; but there is a difference. Suddenly disturbed, it utters the cry of the common paddy bird (*Ardeola grayi*) when alarmed ; if suspicious of danger, it makes a noise like "krrrrr" pronounced in a subdued voice. It is extremely shy of open ground and will invariably fly across even a few feet of open path in the jungle ; when flushed, it takes to the nearest tree or any thickly foliaged place available, and is quite at home perched on a branch. We have put up many during our walks, generally with dogs. I have never seen one during the dry months, though I am constantly in their breeding haunts during that time. Whether they migrate or not from the district we do not know for certain, but it seems probable. It would be interesting to know where they go.

I have kept this Crake in a cage on several occasions in my bungalow, and the birds have, after a few hours, become quite unconcerned as to the unaccustomed surroundings. When thus caged they are very pugnacious and will instantly go for a finger or hand inserted through the bars. In the jungles they go about with their wings slightly hanging. They feed on insects.

Gorsachius melanolophus or the Malay Bittern was first discovered by J. Davidson in Kanara. He published his observations about this bird in Vol. XII, p. 70 of this Journal (*The Birds of North Kanara*). What he says there as to its habits is absolutely correct. It is not a rare bird in Kanara when one knows where to look for it. I have found many nests perhaps some two dozen in all ; but it is hard work at the best of times

seeking for them as the birds build during the heaviest rains, always in very retired places in thick jungle, generally choosing some steep nalla. The nest is always placed in a conspicuous position, at least it is conspicuous when once discovered, but is easily overlooked and generally in a terminal fork of a branch of a thinnish tree, anywhere from 15′ to 30′ from the ground. I have always found the tops of the hills the surest place for a find and, generally, at the commencement of a nalla; the birds seem to prefer to have a bit of flat, open ground under the nest, but never build them exposed to the sky; the nest being invariably overshadowed by the foliage of a high tree. I have never heard the bird utter any sort of cry. It is certainly not exclusively nocturnal in its habits as stated by Oates in his "Birds" (*Fauna of British India*), if indeed it is nocturnal at all; for I have often found it feeding in the day time by the shady pools in the hill nallas as well as on the tops of hills ranges in the damp evergreen jungles. I have put up some dozen birds at different times in such places, sometimes singly, sometimes in pairs, during my rambles in the jungles from May to November. When flushed, the birds generally take to trees and can then be shot; but they are very wary and require careful stalking. The number of eggs laid is generally three, often four, rarely five. The egg is white with a slight greenish shade, of chalky texture, nearly without gloss and measures about 1·90″ × 1·60″, one egg of a clutch of four we have, measures 2·20″ × 1·50.″ All the eggs are oval with a decided tendency to a point at one end. The birds are very regular in their time of laying, which is always the end of July or the very commencement of August. Like the *Banded Crake*, this Bittern does not seem to stay in the district during the months of December to April. I have certainly never seen one in those months.

T. R. BELL.

KARWAR, 9*th March* 1902.

No. XVII.—CANNIBALISM IN SNAKES.

It is of course a well-known fact that the King Cobra or Hamadryad (*Naia bungarus*) feeds on other snakes, and the last specimen we had alive in our Museum, ate 13 live snakes almost all of which were Dhamans (*Zamenis mucosus*), each measuring from 4 feet to 9 feet in length. The Common Kraits(*Bungarus cœruleus*) also whenever we have kept them alive have refused all food except other snakes and apparently had no preference for one species more than another.

About two years ago, however, one of the live Pythons (*Python molurus*) in our collection quarrelled with his companion in one of the cages, the bone of contention being a partridge which had been put in the cage as food, and after swallowing the other Python, measuring about 9 feet in length, he ate the partridge.

The most recent instance of cannibalism was amongst the Cobras (*Naia tripudians*) a few days ago. There were 3 cobras in the cage, a black one and

two yellow ones. Some frogs had been put in as food, and the black cobra and one of the yellow ones attacking the same frog, the black cobra swallowed both the frog and the other cobra. Both cobras measured about 4½ feet in length.

With the Daboias or Russell's Vipers (*Vipera russelli*) which we have alive—it frequently happens that if hungry, two vipers will try to obtain one rat even if one of them has not bitten it, but when their heads approach each other in trying to swallow the rat, one of them always manages to let go—and the viper who has secured the head of the rat first, is almost always the winner.

In the case of cobras, however, they are more tenacious of their hold and their fangs being fixed slanting backwards, it is probably more difficult for them to detach themselves from their prey, and the victim only finds out his mistake when it is too late to extract himself from the other cobra's throat.

W. S. MILLARD,
Honorary Secretary.

BOMBAY NATURAL HISTORY MUSEUM,
19*th March* 1902.

No. XVIII.—MISCELLANEOUS NOTES ON BIRDS' NESTING ROUND POONA AND ELSEWHERE.

THE RED-HEADED MERLIN (*Falco chicquera*).—Although fairly common, I have not been over successful in obtaining its eggs. So long ago as February 1888, I found a nest at Rajkote containing 4 fresh eggs, which was situated in a mango tope high up and overhanging a well. It was after a shoot, and I told one of the beaters to climb up and investigate. As he refused, I said I would not pay them any wages until I had got the eggs and drove away. I must confess the nest was in a most "hairy" place. I had hardly gone a couple of hundred yards when I heard the beaters shouting out. I at once came to the conclusion that one of them, in endeavouring to reach the nest, had been precipitated into the well by the breaking of a bough. I returned as rapidly as possible, and was relieved to find that nothing had gone wrong, and that the man had got the eggs. On this the beaters received their wages. From that date till the present year, I have never come across the nest again. On the 7th January, not far from Poona, I was attracted by the call of one of these birds and, at the same time, saw it swoop down and up again over a bare Banyan tree alongside the rail. I immediately proceeded to examine it, and was not long in discovering two crow-like nests. On throwing up stones at that which appeared the freshest, I observed a bird moving within it. I had only about 10 minutes in which to catch the train, and fortunately the station was very handy and the tree easy to climb, so I sent my *shikari* up double quick and obtained 3 perfectly fresh eggs. While these were being taken the parent birds sat on

the top of the tree and remonstrated to some time. On the 12th January I obtained 3 more fresh eggs from a nest, situated very high up among the leaves of a mango tree, one of a to: e. The nest was taken with some difficulty, as for about 20 feet from the ground the tree was branchless; consequently, a rope had to be requisitioned. This nest was discovered simply through the fussiness and noise of the birds when building, though they were quite silent while it was being taken.

BONELLIS OF THE CRESTLESS HAWK EAGLE (*Nisætus fasciatus*).—On the 14th January, I was fortunate enough to come on another nest of this species in the Sholapur District. It was an enormous structure of sticks, placed at the very top of a lofty tree and visible from a considerable distance. It has probably been used as a nursery for many years. I got a boy to climb the tree after some difficulty, during which operation the female vacated it and took up her position on an adjacent one. I was not sure of the species, so intended shooting her if the nest contained eggs, but she defeated me by betaking herself off before this had been settled. The nest contained two hard-set eggs, one of which I managed to clean by the "water system." While the boy was descending the tree, I heard a rushing of wings and, looking round, saw the male coming out of space at a tremendous pace, like a bolt from the blue, straight for the nest. It seemed very cruel, but I had to shoot him to identify the species. I hit him hard which stopped him, he turned, reeling as he flew, went a few hundred yards, wheeled, and then fell dead—a truly glorious bird. I hope to visit the spot again next year and am curious as to whether the nest will be re-occupied.

THE BLACK-WINGED KITE (*Elanus cæruleus*).—Though I have been at Poona three years, until the present year I have hardly seen any of these birds. Of late, they seem to be far more common. They apparently have a penchant for open grass lands, studded with babul trees. It is a pretty sight to watch them hovering in the air and then dropping, like a stone, on to their prey or, when disappointed, moving off to repeat the process elsewhere. Towards the end of December, I found a nest, built in the slender branches of a thorny tree, about 20 feet from the ground. It was difficult to get at owing to the thinness of the branches and unfortunately contained young. The birds were very fussy, wheeling, and flying round, uttering a low whistle or squeal. They apparently haunt the nest with their young, after these have once flown, as on visiting the spot later, I found them still loitering around.

THE ROCK-HORNED OWL (*Bubo bengalensis*).—Though a fairly common bird and found in most localities, I have only just obtained its eggs. I was out in October near a large tank, where these birds had taken up their abode and were to be seen at all hours. I hardly expected to find eggs so early, but on searching the banks, I came on a nest containing 5 eggs, partially incubated, and all in different stages. Date 18th October. There was no nest, but the earth had been hollowed out and sifted, as it was very fine. The hen was

sitting. I stood watching her for a few moments, her ears and great yellow eyes, like two full moons, being visible. On her quitting the nest, I took the eggs. She flew across some intervening water to commanding ground opposite, where her lord and master joined her, and they both commenced hooting me. The nest faced north. I came on another nest, which looked quite ready, though eggs had not been laid. I got a second clutch towards the end of November, taken by my man.

THE INDIAN GREY SHRIKE (*Lanius lahtora*).—Three years ago, at the commencement of June, I came on a family of grey shrikes, which I thought had not long left the nest. On looking round I found it and came to the conclusion that eggs must have been laid early in April; consequently, about the middle of March last year, I again visited the spot, and within a few yards of the old nest I found the new one, which, to my disgust, contained unfledged young. This year, however, I took steps sufficiently early, and found the nest very close to the old spots, and got 2 eggs. Later on, I got another containing 4 fresh eggs, and a third, containing 3. This latter nest was placed in the same tree, and within 6 inches of a nest that had been occupied last year. I am sure that most birds breed every year in almost the same locality, unless disturbed or otherwise frightened. I have had many experiences of it. The grey shrike builds a very compact nest, usually in a densely thorny bush or tree, which takes trouble to obtain. They are very fond of incorporating rags in their nests and building on an old nest of the white-throated Munia (*Uroloncha malabarica*).

TICKELL'S BLUE FLYCATCHER (*Cyornis tickelli*).—Last year I found several more nests of this pretty little bird. The first was situated down a well where a brick had been displaced, and contained 4 fresh eggs. I was looking into the well when the bird flew up: thinking this peculiar, I instituted a search, and was rewarded. Date 17th June. On the 26th June, I found 3 nests, each containing 4 eggs; two lots fresh and one incubated. One was situated in a bank under a prickly-pear root, another in a crevice of a banyan tree and the third in a rubbish heap of dry leaves, all well concealed. In addition to the above I found two more, one in the hole of a tree and the other in the face of a wall, where a brick had been displaced, quite exposed. When the hen is sitting the male keeps up an incessant little song. I found the best method to pursue was to follow him. In due time the hen, apparently warned by him, leaves the nest; once you catch a sight of her, do not let her escape you, as very shortly she will return to the nest, and that is all you want. Oates says 3 is the normal number of eggs, but from the above 4 would seem more usual in these parts. The nest is very solid, built of roots in which a certain amount of earth is incorporated and embellished with dried and skeleton leaves.

THE SPOTTED MUNIA (*Uroloncha punctulata*).—After much waiting, I found the nest of this little Munia last year, and obtained several clutches of eggs. The first nest I came on was placed in a thorny tree, standing in water,

and about 6 feet from the ground. It contained 8 incubated eggs. Date 10th August 1901. On the 27th August and 7th and 8th September, I found more nests all containing fresh eggs, some 4, some 6. These were all situated in low thorny bushes well within reach of hand. The nests are enormous about the size of a man's head, very rough and untidy, but of the strict Munia type, *viz*, a ball of grass, with the entrance at one side.

As a rule they select a site close to water and liable to inundation, which give the nests the appearance of drift and rubbish caught up in the branches. There is no lining. These Munias use fresh green grass to construct their nests with, wh ch they obtain by tearing strips off the larger sorts of grass. On seeing one of them flying along with a long green strip behind it, I thought I had come on a new description of parrot !

THE WHITE-BACKED MUNIA (*Uroloncha striata*) appears to be the common Munia below ghats. I found a nest being built in a cashew tree on the 13th November near Sawantwadi. It resembled that of the White-throated Munia (*Uroloncha malabarica*) but I think was neater, the entrance being more neatly finished off with flowering grasses and more elongated. On the 30th November, at Khed, Ratnagiri District, I found 2 nests, one with young and the other with 4 fresh eggs. These were situated on thorny trees and were from 6 to 10 feet from the ground.

THE CRESTED BUNTING (*Melophus melanicterus*). Barnes states that this handsome little bird is an adept at concealing its nest. Last year I found a few nests at Satara, which do not bear out this statement. The first contained 4 young birds very nearly ready to fly. I discovered the nest by watching the parent birds, who, in due course, conveyed food to the nestlings. They were jolly little chaps and I am sorry they took to flight on my investigating their quarters though I had no sinister designs on them. The mother was very much alarmed and tried to distract my attention from them, by fluttering along the ground with outspread wings as though in her last death agonies. This particular nest was situated under a projection on the steep slope of the Satara Fort hill and protected from the prevailing wind by a tussock of grass. It was just such a nest a lark, robin or wagtail might build. The second nest was being constructed and was in a similar position. The third was placed alongside the road leading up to the Fort and no attempt at concealment was made. On jumping on to the road, the hen darted out and I had no difficulty in finding the nest which contained 3 hard set eggs. I found these nests in June and July. The cockbird, who is very smart in appearance with his crest and shining black and cinnamon kit, has a very melodious little lay which he keeps up at frequent intervals.

THE CHESTNUT BITTERN (*Ardetta cinnamomea*). I believe the nesting of the Chestnut Bittern in the Dekhan is not common. I was fortunate enough to find two nests last year containing 3 and 5 fresh eggs respectively in July and August, while searching some thick tangle, growing in water, in the hopes

of coming on some Rails' nests. Both nests were placed on beaten down reeds and consisted of mere platforms of grass and had no great pretensions as works of arts. In the case of the finding of the second nest, the bird flapped up within a few yards of me, in fact so close that I could almost have knocked her over with a stick.

THE BLUE-BREASTED BANDED RAIL (*Hypotænidia striata*). As mentioned above I found a nest of this bird containing 9 beautiful fresh eggs on the 8th September. The bird lay very close and only rose as we were practically stepping on her. In spite of this we had to search very diligently before we succeeded in discovering the nest. It was well down in some tufts of grass and completely concealed, consisting of dry grass, welded into a compact mass. I always search for a nest of this description with a line of beaters else it would be hopeless. Captain Payn, K.S. L. I., found a nest in the same locality about a month earlier, but was unfortunate enough to step on the nest and break some of the eggs.

R. M. BETHAM, MAJOR,
8th Bombay Infantry.

POONA, 20*th March*, 1902.

No. XIX.—*PTEROMYS INORNATUS.*

I am glad to be able to confirm, to some extent, Mr. Clutterbuck's theory, that all the Large Red Flying Squirrels do not hibernate as stated in Vol. XIII, No. 3, page 531 of this Journal. Whilst out on a shooting trip, this February (1902), my coolies caught and brought me one, that had found its way, into a gujar's hut, that morning, which the coolies were at the time occupying. The same morning and just as it was getting light, I saw one fly across, from one tree to another, quite near the camp and of course this might have been the same one that was soon after caught by my coolies. This was on the 25th February at an elevation of 10,500 ft. I have seen and caught them, as late as 16th December, at over 10,000 ft. and after brown bears had hibernated that year, and have heard of some being shot in Dharmsala, in the Kangra District, Punjab, during January.

C. H. DONALD.

BHADARWA, JUMMU STATE, 15*th March*, 1902.

No. XX.—OCCURRENCE OF THE RED-BREASTED MERGANSER (*MERGANSER SERRATOR*) NEAR QUETTA.

When shooting yesterday on the tank at Khush-dil-Khan, about 7 miles from Peshin, Captain Macnamara of my regiment shot a specimen of the Red-breasted Merganser (*Merganser serrator*). I was one of the party, but was unable to name the bird at the time, never having seen one before. On returning home, by referring to my books, I was able to identify it. I did not sex it, but from the plumage it was evidently a young male. I regret that

had no time to preserve the specimen, which is very rare within Indian limits, only one or two others having been previously recorded. It is, however, stated in Vol. IV. of "Birds of the Fame of Indian series to be probably fairly common on the coast of Baluchistan," and "both a salt and fresh-water bird," so there is nothing surprising in its occurrence in this neighbourhood. The tank at Khush-dil-Khan is a fairly large artificial one, formed by bunding up a valley; and is well known to most sportsmen who have served in the Quetta District.

C. G. NURSE,
(Major, 13th Bombay Infantry).

QUETTA, *4th April*, 1902.

No. XXI.—NESTING OF THE GREY PELICAN (*PELECANUS PHILIPPENSIS*) IN THE CUDDAPAH DISTRICT, MADRAS PRESIDENCY.

On looking over Blanford's "Birds" the other day I noticed the statement that of late years no authentic account of Pelicans breeding in India has appeared. In 1890 when in camp in a secluded valley in the extreme East of the Cuddapah District, in the end of March, I found a large number of Grey Pelicans breeding in company with a community of Painted Storks (*Pseudotantalus leucocephalus*). The nests, of which there were several hundreds, were on neem and tamarind trees in a small village called Buchupalle. The people of the village were very much averse to any interference with the nests. The birds trusted them and they would not have them injured, they said; so I did not examine many nests. I got three eggs of the Painted Storks, hard set, from one nest, but in every other nest, so far as I could see, there were young birds. The parent birds of both species kept coming and going, bringing quantities of a fine trailing of water-weed, from a tank about two miles off, to feed their young.

W. HOWARD CAMPBELL.

GOOTY, MADRAS, *2nd April*, 1902.

PROCEEDINGS

OF THE MEETING HELD ON 17TH DECEMBER, 1901.

A meeting of the members of the above was held on Tuesday, 17th December 1901, Major D. Prain, I.M.S., presiding.

NEW MEMBERS.

The election of the following new members was then announced :—

Mr. L. C. H. Young (Bombay); Lieutenant L. C. Brodie (Trimulgherry); Mr. W. A. Conduit, C.E. (Seoni District, C. P.); Captain C. H. Lincoln, I.M.S. (Bombay); Major R. E. S. Davis, I.M.S. (Rangoon); and Mr. J. A. B. Ball (Umballa).

Mr. H. M. Phipson, the Honorary Secretary, acknowledged receipt of the following contributions to the Society's Museum since the last meeting :—

Contribution.	Description.	Contributor.
1 Palm Civet (alive)	*Paradoxurus niger*	Mr. E. W. Thompson.
1 do. do.	*Do.*	Mr. Fazalbhcy Laljee.
2 do. do.	*Do.*	Mr. Paul Girhardt.
A Collection of Moths.....	.....	Do.
Lizard's Eggs	.....	Mr. M. Loam.
1 Snake	*Lycodon aulicus*	Mr. H. Stauber.
1 Woodcock	*Scolopax rusticola*	Major G. A. Leslie, R.E.
1 Krait	*Bungarus cœruleus.*	Mr. J. Stiven,

CONTRIBUTIONS TO THE LIBRARY.

The Flora of the Presidency of Bombay, Part I, by Theodore Cooke, C.I.E. (from the author); the Distribution of Vertebrate Animals in India, Ceylon, and Burma, by W. T. Blanford, F. R. S. (from the author); Catalogue of the Indian Decapod Crustacea in the collection of the Indian Museum (Part I, Brachyura), from the Trustees; the Coleoptera of South Africa (Peringuey); Annals of the Royal Botanic Gardens, Calcutta, Vol. IX, Part I; and Living Animals of the World, Parts I to VIII (from Mr. William Phipson).

THE VICTORIA GARDENS.

The Honorary Secretary drew the attention of the members to the new and extensive aquatic aviary which had been completed at the Victoria Gardens, and expressed a hope that members who were in a position to obtain specimens of wild ducks, geese, swans, pelicans, flamingoes, storks, cranes, &c., would communicate with the Superintendent of the Gardens.

DEATH OF MR. L. DE NICÉVILLE.

The Honorary Secretary stated that the Society had suffered a heavy loss through the death of Mr. L. de Nicéville, the well-known lepidopterist, which took place in Calcutta on the 4th instant. Mr. de Nicéville had been an important contributor to the Bombay Natural History Society's Journal since 1887, as reference to the General Index of Vols. I to XIII (published in No. 5 of Vol. XIII) would show. Looking back through the back numbers of the Society's Journal, members would find 34 coloured plates of Oriental butter-

flies, illustrating no less than 346 species, all of which were produced under the supervision of Mr. de Nicéville, whose untimely death would be deplored by all members of the Society.

PAPERS READ.

The following papers were then read and discussed.—(1) Natural History Notes from Fryer's Travels, by N. C. Macleod. (2) Notes on some of the Plants introduced into the Victoria Gardens, Bombay, during the past eight years (Part II), by Cowasjee D. Mahaluxmivala.

PROCEEDINGS

OF THE MEETING HELD ON 21ST JANUARY, 1902.

A meeting of the members took place on Tuesday, the 21st January, 1902, at the Society's Rooms, Dr. D. Macdonald presiding.

NEW MEMBERS.

The election of the following new members was announced :—

Lieutenant William F. Harvey, M.A., I.M.S. (Saugor); Staff-Surgeon W. Stericker, R. N., H. M. S. Fox, (Persian Gulf); Mr. A. C. Logan, I.C.S. (Broach); Lieutenant B. E. A. Manson (Belgaum); Mr. J. G. Burn, I.C.S. (Madanapalli); Mr. H. B. Peirce (Bombay); Mr. Arthur Langham (Bombay); Major J. R. Stuart, R.A.M.C. (Bombay); Mr. Eric McDougall (Burma); Mr. F. B. P. Lory, B.A. (Bombay).

CONTRIBUTIONS TO THE MUSEUM.

Mr. H. M. Phipson, the Honorary Secretary, acknowledged receipt of the following contributions since the last meeting :—

Contributions.	Description.	Contributor.
1 White-faced Stiff-tail Duck.	*Erismatura leucocephala* ...	Major F. J. H. Barton.
2 Bearded Vultures, or Lamergeyers.	*Gypaetus barbatus*	Mr. C. H. Donald.
1 Imperial Eagle	*Aquila heliaca*	Do.
1 Monal Pheasant.....	*Lophophorus refulgens*	Do.
2 Desert Larks	*Alæmon deserti-um*.....	Mr. Percy Hide.
1 Cotton Teal.....	*Nettopus coromandelianus*...	Do.
1 Griffon Vulture	*Gyps himalayensis*	Major G. S. Rodon.
2 Panther Cubs	*Felis pardus*	Col. L. L Fenton.
1 Bonellis Eagle	*Nisætus fasciatus*	Maj. R. M Betham.
The Jaw-bones of a Whale.	*Balænoptera indica*.....	Mr C. E. Palmer, I.C.S., and Mr. C. V. Vernon, I.C.S.
1 Snake (alive)	*Cerberus rhynchops*	Mr. E. H. Aitken.

PAPER READ.

Captain George Lamb, M.B., I.M.S., read a most interesting paper on the Physiological Action of Snake Venoms and their Antidote, explaining with great clearness, the difference which exists between the action of Cobra poison and that of Daboia poison and maintaining that whereas we possess in Dr. Calmette's Antivenin an infalliable antidote against the former, the remedy is quite useless in the case of the latter.

Captain Lamb stated that, so far he had not made any experiments with the poison of the Phoorsa (*Echis carinata*) or the various species of Kraits (*Bungarus*) having been unable to obtain a supply. He hoped that members of the Society would assist him in his efforts to obtain live specimens of these snakes.

The method of extracting the poison from a live Cobra was demonstrated before the meeting and also the mode of administrating food into the snake by means of a funnel.

A hearty vote of thanks was passed to Captain Lamb for his valuable paper, which will duly appear in the Society's Journal.

Mr. Comber called attention to letters received from Mr. W. D. Cumming, of Ormara, on the Mekran coast, reporting the occurrence there of the Red-breasted Merganser (*Merganser serrator*), of which there was previously only one authentic record within "Indian" limits, and of a species of Diver (*Colymbus*) which genus has never been known or suspected to occur in any part of the Indian region. Some curious instances of albinism were also referred to, in which some caged Buntings had replaced "plucked" wing and tail feathers by white ones.

PROCEEDINGS

OF THE MEETING HELD ON 18TH FEBRUARY, 1902.

A meeting of the members was held at the Society's Rooms on Tuesday, the 18th February 1902, Mr. F. O. Gadsden, R.I.M., presiding.

NEW MEMBERS.

The election of the following new members was announced :—Mr. R. C. H. Barnard, C.E. (Lanauli) ; Mr. William Hall (Bombay) ; Mr. A. A. Gover, D. S. P. (Vizagapatam) ; Mr. H. A. B. Vernon, I.C.S. (Vizagapatam) ; Mr. J. Humphrey (Bombay) ; the Honorary Secretary of the Sind Club (Karachi) Professor G. A. Gammie (Poona) ; Mr. H. P. Todd-Naylor, I.C.S., C.I.E. (Minbu, Burma) ; Mr. Kirkman Finlay (Rangoon) ; Mr. H. Haussler (Rangoon) ; Mr. Neville Eliot, R. A. (Rawalpindi) ; and H. H. the Maharajah of Mysore (Mysore), (*Life Member*).

CONTRIBUTIONS.

Mr. H. M. Phipson, the Honorary Secretary, acknowledged receipt of the following contributions since the last meeting :—

CONTRIBUTIONS TO THE MUSEUM.

Contributions.	Description.	Contributors.
1 Snake	*Gongylophis conicus*	Mr. R. H. Harter.
1 do. (alive)	*Eryx johnii*	Mr. E. Good.
A Collection of Hymenoptera	.....	Major C G. Nurse.
1 Snake (alive).....	*Eryx johnii*	Mr. E. J Lilly.
1 Do.	*Gongylophis conicus*	Capt. G. Lamb, I.M.S.
1 Cobra (alive).....	*Naia tripudians*	Do.
1 Dhaman (alive).....	*Zamenis mucosus*	Do.
A number of Indian Gerbilles.	*Gerbillus indicus*.....	Mr. A. H. A. Simcox, I.C.S.
1 Puff Adder's Skin	*Vipera arietans*	Major S. Prall, I.M.S.
2 Jackals	*Canis aureus*.....	Mr. C. Merroney.

ACCOUNTS FOR 1901.

Mr. N. C. Macleod, the Honorary Treasurer, placed before the meeting a statement of accounts for the year ending 31st December, 1901, showing a credit balance of Rs. 932-7-3 in cash, and Rs. 4,800 invested in Government Paper. It was resolved that the accounts be passed subject to the usual audit.

ELECTION OF COMMITTEE.

The President, Vice-Presidents, and members of the Managing Committee for the present year were duly elected as follows :—

President—H.E. the Right Hon'ble Lord Northcote.

Vice-Presidents—Mr. J. D. Inverarity and Dr. D. MacDonald.

Managing Committee—Veterinary-Captain G. H. Evans, Mr. E. C. Stuart Baker, Dr. D. MacDonald, Mr. E. H. Aitken, Rev. F. Dreckmann, S. J., Mr. E. Ernest Green, Lieutenant-Colonel K. R. Kirtikar (I. M. S.), Mr. J. D. Inverarity, Mr. W. S. Millard, Colonel H. D. Olivier, R.E., Mr. A. Abercrombie, Mr. E. L. Barton, Mr. R. Gilbert, Mr. E. Comber, Mr. R. C. Wroughton, Mr. T. R. D. Bell, Major A. Newnham, Mr. F. O. Gadsden, Major C. G. Nurse, and Mr. G. O. Dudgeon.

Mr. N. C. Macleod, Honorary Treasurer, *ex-officio.*

Mr. H. M. Phipson, Honorary Secretary, *ex-officio.*

PAPERS READ.

The following papers were read and discussed.

1. "Notes on the Hog Deer in Burma (with Photographs)," by Veterinary-Captain George H. Evans, A.V.D.
2. "Aids to the Differentiation of Snakes," by Captain F. Wall, I.M.S.
3. "Sand Grouse in Northern Gujarat," by Major C. G. Nurse.
4. "Travancore Snakes," by H. S. Ferguson, F.L.S.
5. "A novel method of catching a Jackal," by Major D. Thomson.
6. "Occurrence of the Avocet near Poona," by Major R. M. Betham.
7. "Notes on some Lakhimpur Birds," by H. N. Coltart.
8. "Occurrence of the White-faced or Stiff-tail Duck at Mardan," by Major F. J. H. Barton.
9. "A man-eating Panther," (with a Photograph), by W. A. Conduit.
10. "Extraordinary magnitude of a Snake's meal," by Captain F. Wall, I.M.S.
11. "Our Collection of Eagles and Owls," by E. H. Aitken.

PROCEEDINGS

OF THE MEETING HELD ON 18TH MARCH, 1902.

A meeting of the members was held at the Society's rooms on Tuesday, the 18th March, 1902, Mr. F. O. Gadsden presiding.

NEW MEMBERS.

The election of the following new members was announced :—

Mr. Donald N. Graham (Bombay); Captain A. L. Valentine (Bombay); Mr. J. D. Mills (Hampshire, England); Mr. A. L. Whittell (Bombay);

Mr. John S. Anderson (Coorg); Captain P. F. Chapman, I.M.S. (Raipur, C.P.); Mr. C. G. C. French, I.C.S. (Raipur, C.P.); Mr. W. De Morgan, C.E., (Waltair); Mr. G. Monteath, I.C.S. (Dharwar); and Mr. Douglas Dewar, I.C.S. (Almora, N.-W. P.).

CONTRIBUTIONS.

The Honorary Secretary acknowledged receipt of the following contributions since the last meeting:—

CONTRIBUTIONS TO THE MUSEUM.

Contributions.	Description.	Contributors.
3 Palæolithic implements found in Somali Land.	.....	Mr. H. W. Seton-Karr.
A collection of photographs of Animals shot in East Africa.	.....	Mr. T. J. Spooner, C.E.
1 White-bellied Sea Eagle	*Haliaetus leucogaster*	Mr. C. E. C. Fischer.
1 Shama.....	*Cittocincla macrura*	Mrs. Bythell.
4 Snakes (alive)	*Dipsas forstenii*	Capt. C. Lamb, I.M.S.
1 Shikra.....	*Astur badius*	Mr. J. D. Inverarity.
7 Rats (alive)	*Gerbillus indicus*, *Nesocia bengalensis*, *etc.*	Mr. A. H. A. Simcox, I.C.S.

MINOR CONTRIBUTIONS

From Mr. H. B. Peirce.

PAPERS READ.

"Bombay Ducks from a Sportsman's Point of View," by Colonel H. D. Olivier, R.E.

A very interesting lecture was given by Colonel Olivier on the above subject in which he pointed out from the specimens of ducks in the Society's collection, the distinguishing characteristics of each species, and gave some account of his experiences in duck-shooting in the Bombay Presidency.

Mr. E. H. Aitken read a paper written by Mr. S. M. Fraser, I.C.S., on "Tiger-netting in Mysore," in which he observes that it is probable that in spite of what Sanderson and others have written, there is still a good deal of misconception about tiger-netting as pursued in Mysore, which is a genuine native sport well worth witnessing by any one interested in wild beasts and their ways.

The paper will appear in full in the Society's Journal.

PROCEEDINGS

OF THE MEETING HELD ON 22ND APRIL, 1902.

A MEETING of the members was held at the Society's rooms on Tuesday, the 22nd April, 1902, Dr. D. MacDonald presiding.

NEW MEMBERS.

The election of the following new members was announced:—

Major T. D. Collis Barry, I.M.S. (Bombay); Captain P. F. Pocock (Khar); Mr. B. H. Barlow-Poole, I.F.S. (Anantapur); Major W. E. Jennings, I.M.S. (Poona); Captain M. B. Roberts (Lansdowne); Lieutenant Richard Clifford

(Myitkyina); Captain H. Des Vœux (Bassein, Burma); Mr. W. Sparke (Bassein, Burma); Mr. J. H. Burkill (Calcutta); Mr. F. D. Little (Katha, Upper Burma); Dr. W. S. J. Shaw (Sholapur); and Mr. H. V. Purkis (Bhadarwa, Jammu State).

CONTRIBUTIONS.

The Honorary Secretary acknowledged receipt of the following contributions since last meeting :—

CONTRIBUTIONS TO THE MUSEUM.

Contributions.	Descriptions.	Contributors.
1 Snake (alive)	*Echis carinata*	Dr. A. H. Deane.
1 Snake	*Lytorhynchus paradoxus*	Lieut. G. A. Hawks.
3 Bear Skulls	*Melursus ursinus*	Capt. R. G. Burton.
7 Panther Skulls	*Felis pardus*	
1 Hyæna Skull	*Hyæna striatus*	
1 Wolf Skull	*Canis pallipes*	
1 Wild Dog's Skull	*Cyon dukhunensis*	
1 Indian Gazelle's Skull	*Gazella bennetti*	
2 Oorials (alive)	*Ovis vignei*	Capt. P. Z. Cox, F.Z.S.
1 Snake	*Dipsas forsteni*	Rev. B. Wright, H.M.S. Highflyer.
1 Hamadryad (alive)	*Naia bungarus*	Mr. E. H. Aitken.
1 White-legged Falconet	*Microhierax melanoleucus*	Mr. Vernon Woods.
1 Large Indian Pratincole	*Glariola orientalis*	
1 Samll Indian Pratincole	*Do. lactea*	
3 Eggs of Indian Green Barbet.	*Thereiceryx zeylonicus*	Mr. J. Spilling.
A quantity of Fossil shells	.....	.....
2 Spotted Hawk-Eagles (alive).	*Spizaetus nepalensis*	Mr. C. H. Donald.
Some fishes, shells and marine specimens from the Persian Gulf.	.....	Mr. F. W. Townsend.
1 Snake	*Typhlops acutus*	Mr. F. Dundas Whiffin.
1 Chesnut headed Shortwing	*Oligura castaneicoronata*	Mr. S. L. Whymper.
1 Black-chinned Yuhina	*Yuhina nigrimentum*	
1 Bronzed Drongo	*Chaptia ænea*	
Some photographs of the growth of *Ficus coræifolia*.	.....	Col. St. G. Gore, R.E.
1 Dhaman with Eggs	*Zamenis mucosus*	Major C. T. Hudson, I.M.S.
1 Snake	*Oligodon subgriseus*	Mr. E. H. Aitken.
Some Scorpions	.....	
1 Nest of Malabar Wood-shrike.	*Tephrodornis sylvicola*	
1 Lizard	*Varanus bengalensis*	Genl. W. Osborn.
1 Himalayan Palm Civet	*Paradoxurus grayi*	
1 Leopard Cat	*Felis bengalensis*	
8 Photographs of Sea Fish	.....	Mr. C. J. I. Jones, R.I.M.
1 Sword fish	*Histiophorus sp*	
1 Snake (alive)	*Tropidonotus plumbicolor*	Mr. P. Gerhardt.

MINOR CONTRIBUTIONS FROM

Mr. A. R. Wilson (Almora, N.-W.-P.), Mr. D. A. Macmillan (Orissa), Mr. J. Spilling, Mr. G. P. Millett (Kanara), and Mr. G. R. Lowndes.

EXHIBITS.

A large Sword Fish (*Histiophorus sp.*), presented by Mr. C. J. I. Jones, R.I.M., was exhibited. It was captured off the Laccadive Islands and measured 9ft. 11in. in length and 100lbs. in weight. Some excellent photographs showing the rapidity of growth of *Ficus cordifolia* on a mango tree were exhibited by Colonel St. G. Gore, R.E., of Dehra Dun.

PAPERS READ.

The following papers were then read: "Note on the habits of the Banded Crake (*Rallina superciliaris*) and the Malay Bittern (*Gorsachius melanolophus*)," by T. R. Bell, I.F.S.; "Notes on some *Nepenthes* and other new stove plants introduced into Bombay," by W. S. Millard; "Miscellaneous notes on Birds' nesting round Poona and elsewhere," by Major R. M. Betham.

DR. MACDONALD'S RETIREMENT.

Mr. Aitken then asked permission to say a few words about the chairman, who was very shortly to leave, and would probably never be present again at a meeting of the Society. He said that probably few of those present knew the real origin of the Bombay Natural History Society, or had any idea that Dr. MacDonald was the *fons et origo* of the whole thing. But such was the fact. It was early in 1883 that Dr. MacDonald suggested that it would be an excellent thing to form a Society for the study of Natural History. Dr. Maconachie told the speaker, who welcomed the suggestion, and with the view of translating suggestion into fact, asked Dr. Maconachie to name a day and place for the first meeting. The result was that six gentlemen met in the Victoria and Albert Museum and constituted themselves the Bombay Natural History Society. The six were, Dr. Maconachie, Dr. MacDonald, Dr. Atmaram, Mr. J. C. Anderson, Mr. J. Johnston, and the speaker. The membership now was over seven hundred, and of the six original members only Dr. MacDonald and the speaker were in Bombay this day. Dr. MacDonald had been one of their Vice-presidents all through the Society's wonderful career. He had often filled the chair at their meetings. He had continuously filled a place in their slender list of office-bearers, and that was a difficult place to fill, as the Secretary knew. He was leaving them at last, and the speaker thought they ought to remember gratefully his long connection with the fortunes of the Society and wish him a happy time in his own land.

The proposition was seconded by Mr. Millard and carried by acclamation.

Dr. MacDonald replied briefly, disowning the credit which Mr. Aitken had given him and thanking the members for their kind thoughts of him.

A vote of thanks was passed to the donors of the papers, and the meeting then terminated.

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